FIGURE 1A

KCN6q gene: DNA sequence

1. Underlined nucleotides in capitals represent exons.
2. Initiating ATG codon in exon 1 and terminating TAA codon in exon 14 are shown in bold italics
3. D6D280 genetic marker and phosphoglycerate mutase pseudogene are bold underlined
4. The exact lengths of the gaps between exons 1 and 2, 2 and 3, 10 and 11, 11 and 12, 12 and 13, 13 and 14 are unknown; these gaps are presented as runs of ten **bold n** as a convenience only

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   1   CTGGAGTGAG GCGCGGGAAG ATGCCTGGTC CTTGCCTCGC GGACTTGGCA
  51   GCCGCGTCCT GCGGGTCTGT CCACTGAACT GCTGAGGACT GCGGCGGTGG
 101   CCTGAGGGAG AGCCGCCGGG GCAACGCAGGG GGCCCGGATG AGCCTGCTGG     Exon 1
 151   GGAAGCCGCT CTCTTACACG AGTAGCCAGA GCTGCCGGCG CAACGTCAAG
 201   TACCGGCGGG TGCAGAACTA CCTGTACAAC GTGCTGGAGA GACCCCGCGG
 251   CTGGGCGTTC ATCTACCACG CTTTCGTnnn nnnnnnnttc cttttctatt
 301   cttattatta atatatgatc ttattattaa taatataaag gaatagcaaa
 351   tgagaatcca tgagcaatat cagaccatga aaatgagcca gtggctgagt
 401   aacaaccaat taggacactt gatagtttag caaagttgcc aaacaggaga
 451   cagactcggc tcctttgaac gaagagtgac tgcagtgtgg attccccaga
 501   taggagagca agaacatact ttctgggcct ctctcaggat cgttgtttgg
 551   gaaggaagtt gtatgggaaa ttcacaaact cttagatgct aacatttaaa
 601   tgcagcatgc cacacacaca aacccacaaa cacaaccttt ttttcatcaa
 651   taaaattgca gaggagcccc atttgcacag tatatcacat tgtattttaa
 701   tatccaaaat ggctagtccc ttccagagtt tttatgagtt aatgtgtgct
 751   aatttaatgg gcctggtgct ttattcattt gaagcaagaa attaagtctg
 801   tgataataag gtaaggttct tatcagattt ctctttttgt tgttttacag
 851   TTTTCTCCTT GTCTTTGGTT GCTTGATTTT GTCAGTGTTT TCTACCATCC     Exon 2
 901   CTGAGCACAC AAAATTGGCC TCAAGTTGCC TCTTGATCCT Ggtaagtgaa
 951   acatgaacaa gaacgtacat gaatgttgta taagaactgc ctataacatt
1001   tatactatgc atcttatcct acaaaaaaat cctatctaaa aaagagttac
1051   tgagaaatat aaaaatgtca aagattactg aaacatttgc ccaccaattt
1101   aacatgtagt caatccttag aaatatatag aaatgttcag gattgctatt
1151   acacagcaat atcttgtgtt gtagatatat cataaataga aggcaatatt
1201   agaaagcagt tttaagtatg tttatctatg ctaataaaca aattatataa
1251   gaagaatcag tatctatgag gcctctcatt atattgtgaa agactataga
1301   gtagagagca ttttccaata actgtaattt ggcagtagct aaatataatt
1351   ggccaagaac tatgaacata tggcacctca taagaaaata gaaggctcct
1401   tcatgctctt ttcaaccaac agactgcatt atgagttttg ctgctaatgc
1451   agttacctgg tgataaattc tgcagtttgc tctgtttcca ttatgctgtc
1501   aatcctcaac cacacagaat tgctcaattc actttnnnnn nnnnnacgag
1551   gtcaggaggt cgagaccatc ctgcctaaca cggtgaaacc ccgcctctac
1601   taaaaataca aaaaattagc tgggcgtagc tactcaggag gctgaggcag
1651   gagaatggcg tgaacctggg aggcggagct tgcagtgagc cgagattgcg
1701   tcactgcact ccagcgacag agccagactc cgtctcaaaa aaaaaaaaa
1751   aaaaaaaaa gagtatactt gatttatggc atgagtggtc ttgaatgatt
1801   ttgatggatg actggaaaca attagagata taaataaata gcacagaatc
1851   atgacagatt tcatgaagaa tacactgtga agattcacat ggttaataac
1901   attgaaatta ttaaaataaa agagactgca tatattagat ttttctttgt
1951   gatctagttg ttcaaagcag cagaaaactt taaattttcc ttaattttga
2001   aagtgtgatt aatgaatat tgttacaatg ccattgattt atatactttg
2051   aggatagtta acttctttat gtttattaga aattgcactg agagctaata
2101   tgcagtttct attggtggtg atatgttctg ttaacagggc ctcctgtcag
2151   ttttttattct gagatttctg cctttcctgt tcttttgcat gagcctaact
2201   gactgagttt caatatcaag ttctgaaagc aagtgagcat actagtgtgc
2251   atgcaatgtg cacagaaaga tgtgtttcc tacctctcaa agctcaccaa
2301   aggatattac tcatattgcc acaaagtaca tttacaccaa taacacatac
2351   tttggtaatg ggaaaaataa ataatcttag gtaataaaat gcactttggt
2401   gcttataaag gaaaataatc atcacaggta gaagaggagg aaggcaagac
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FIGURE 1B

```
2451  taggttttga ttcaaaatgt tttctgtttt gctaggaagt ctagaaggaa
2501  tttggtcaaa tgacctgagg aggcaaggag atttctccca gtggcacatg
2551  gcagtccaca agaagactag gggcagggaa acaaagcaag attgtatctg
2601  atttctacag gactccaaca ctaccctgcc aatacccttt tctcctctga
2651  aagccatgat cccaaaggtt tccatttctt ccgggttttt cacattctac
2701  caacaagcag aatgtcttcc ccactgacag ctcaacagtt gagtttttcg
2751  gggttctacc ccttcatcaa cacagccttt gctttcctgg ttactgagta
2801  aataaaacac actggccact tctgcttagc cttcaggagc cactctggct
2851  ccaccctgaca gttccatttc ctccaagaac taagacattt ggagattctg
2901  cctaaaatat gcttaaataa aagggataaa ctgtctctca ctttctttcc
2951  cccacagctt gtcttaagaa caacggtgta accattagtg aaaaatcctt
3001  tcaggctagt aaaatgtaaa aagagaagag gtatcgggta acaacaaatg
3051  aaaataaaat cattcagtgg tagaaaccat aggagtgaaa ttaggtagtt
3101  actgtcctcc agcttacatt aatcaaaata agcccacact gtcactaaga
3151  catcttgcag taagaagcca ttcaccctct cattgcaatt agtgtcataa
3201  agctgaatag acaggtcaga aatgaaaatc ataggccaat taagttattc
3251  tcattttttcc acctccagct agctcttttt gagaattttg attttaatag
3301  ataataaaac agtatgctaa ttgggtggtg ctgagcctga agccgtgaac
3351  tgaaggaaac ttcaacaaac atttggctag ggcctgctct aagcagaggg
3401  gctacgacaa tgggtaaggc atttctctag aaaccagcac tcagcagaat
3451  ttctggcacg agattttgtg agttttctag tggtgtgtct tatcttcccc
3501  caatagatta taaactcctc gagggtgaca gaacacattg ctgatcttta
3551  tatcctgcat gtttatggta ttcggtagac atttataaaa tgaattcatg
3601  aaaagcagaa catctagaaa tgaagtcaac attgcagaga agttagctat
3651  atgaaactct gtaaataccc tcaaggaaga aggaagaagc agattttctg
3701  gaaatcaagg gacctcccag tataagagca attcctttgg tccaaagaag
3751  ggcagctata agaacagaga cataactcct ccgtaagaaa agataaaaat
3801  tctgaaagtt ctctaagaac atgcccagcc ctgacctgcc tctcactctc
3851  agtagcatgg aagccgtact atctcttatc ttgacacaag catccacttc
3901  aatccacagg acaaatatca ccaatatgag aagataagat ctgtttttata
3951  gtcaacttgg ctgacatgta ctaatttctc aaggtcagga tagctctcta
4001  aatagaaata cttgtttgtt ttaaggaatt ttatttaaat ttgtgtatct
4051  taaatttttaa ttttgatctc ggctcactgc aacctccacc tcccaggttc
4101  aagcaattct cctgcctcag cctcctgagt agctgggatt acaggcacct
4151  gtcaccatgc ctggccaatt tttgtatttt tagtagagac cggatttcac
4201  catgttaacc aggctggtct caaactcctg acctcaagtg atctgcttac
4251  caaggtctcc cagagtgctg agattacggg catgaaccac tgctcccagc
4301  ctcatgtagt tcttaagagg aagaaaagcc tatagattag tgagaagtag
4351  acaaattagc aatttgaatc aaatgaaaac ttggtttgat ttcattcatt
4401  ttggagacac tttcggtgtt tccattttga tctgattcag gacactgatc
4451  ttcgattcta agttgcactg gttaatttgt gattatttta caaaatcata
4501  acagaataca tatctgggtc cagttcaagg tacagcaagc cattttcaat
4551  gtttccagct tggtgtttat gattcataca tgaatcattt gggcatgcag
4601  acacacccaa atagaaacct caaaccaatt aaggtataaa taggtttagg
4651  atgggggagg atggacaaca aaaaaaacct cagtaaggct cctccacaaa
4701  gggcaccact tcagcttggt cccatgggca gacttcacct gtggcaggtg
4751  aaggggaaag cctaagacat cctgtgccct gatgcagatg tgacttacag
4801  aacataaaac gtaaaggcag aagggatcat ctgggtggct gctcatacta
4851  ggcaggcatt atagctgctg acaagagcca acccatccct aaggatctaa
4901  aatcactaca agagaggacg gaagtcctct catcatggca tcccaactag
4951  taactgggat gcatagggcc actccaggta ggcagcgagg ggtaaaccag
5001  gaatgtcctg ctgttcccac ctcttttccc caagcagggg gcacccactt
5051  cctgcctcca gcccatatgg tctcaattta tggcctcaat acctgataaa
5101  aaaccagccg tgatccttcc ttagtaacaa agtgtcaatc agtcatttgg
5151  aatggggcat tttcaaacta ttgcctccct atgatcttct gaagaacctc
5201  tgggataaat gaacattgtt atttaggtat ggttaaatga attacttttc
5251  aggagcagat ttatatatta acaggtgtga aaaacttgaa tggataaatc
5301  atttataaag aaatttcagg aatcaactaa tcccaagggg aaagacccac
5351  taagacacta gattttgctg gagctactca aacaaattca tctatcatat
5401  ctacctaagc cttccaatca atgagactag ccgcagtgac actgtctgtc
5451  aaaactacct cagtcatttt tttccaaggc aggaagcatc cataccccctt
5501  cacaccttaa tctaatttcc cctatctcca ccccactccc acttctatga
5551  cccccttccc cccatacccca cccccgaagc atctactagc caacttagtg
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FIGURE 1C

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5601   aagttctgtc acgctctcac aaccacctct gtgcagcaat gattctgtaa
5651   atatccatgt gtcctcaaca ccaggtcaaa ttagtccctt tggtaaaaac
5701   attcattccc tcaaattctc ttccaataca ctaatatacc ttcccaaaaa
5751   gtaaggagaa gcttgaaagc tagctggatt gatgatggta tgtgatgttc
5801   tataagttat agttagtaag catgttttta ggatattttt ctgctctcca
5851   aagagacaca attccggaag atatttactt ttgtgtattt ccacattttg
5901   gtttaagttt ggagccatct ctagatctta atttcattcc cctaatatgt
5951   gttatactag tagaattttc caaattacat agaattataa ctgcaactct
6001   tctgactgat gccttttttt tgcattttat gatgcagttt acatcacaaa
6051   ttctttccct gcagggatta tgtaaagagg catgttgacc tgctagccct
6101   atgttacttt aagtatatgc acacacacaa aaaggaacaa aaacagctgg
6151   gaattgatta tgttgatatt ctgaataaaa gcaatagttc taattatgta
6201   tgtctaatta gccacagctc ttcaagaatt gctgcaaatg tcacagggtt
6251   tataatgtcg gcatttcatc ttcacgaaaa tgctatttga tggcataaaa
6301   ccagaaaaaa ctaatggtca cagaagacag cttgtagatt agacaaaggt
6351   cactgtgttt taatgaacag tgctgttaat taatgagaaa acaactggta
6401   catgagcttt taagcattgt gaatttgtac ccaaaaaatc aatctgccta
6451   aaacaatttt aagtagctaa aaaacaaaat aacggcaaga acataattta
6501   aacctcaaat ggtacagcag agttatatgt atcaattaaa ttgaatcaca
6551   gttctcaggt gtgacatatg aagaggcttc tttaatgcct ggaaaagagg
6601   gttaatatgg attggtattc tcaatacata ttgtagataa aattcaagac
6651   tagctctacc actgcctctt ttcttttttt tttttttttt ttatttgaga
6701   cagtatctcg ctctgttgcc caagctggag tgcagtggca tgatctcggc
6751   tcactgcaag ctccgcctcc cgggttcacg ccattctcct gcctcagcct
6801   cctgagtagc tgggactaca ggcgcccgcc accacaccca gctaattttt
6851   tgtattttta gtagagacgg ggtttcacct tattagccag gatggtctcg
6901   atctcctgac ctcgtgaccc acccgcctcg gcttccgaaa gcgctgggat
6951   tacaggtgtg aaccaccgcg cccggccacc actgcctctt aggcttctta
7001   atttccttat catttaagaa gaataagaaa atgcttctat gttttaccaa
7051   aattctgtga ggacaaatga ggaaccattg taactcctac aaggtgagtg
7101   ataaaaataa tacacattta ttgtctttgc ttttgtaaag agttatccaa
7151   gccaagcttc taggggctta aataaggaag gacaggacca ttgttaataa
7201   catcaagttt ccactcagc tttcctccaa acaagtcaaa tattctgaat
7251   attattcact aatctcttta gctgccattt cagtaaatag cgagcatttt
7301   atttcaacta aaaccaagca agagaaaatg aactgcttta tcctgaggta
7351   cagcagcaaa ggcaccagaa cttgtctcat ggcttaccca gcaagggtca
7401   gaagaaccat ccctaatttta aatcatctcg actgaatgta acagattttt
7451   gtattttcaa ctcatatgaa aataaaacaa tgagacctca tccaaagggt
7501   gatttagaga gtacctctaa acaaaacaca gtgaaaatag acccagcatc
7551   tggatttgaa gaacacattt cctcttacga gtctatccca ttgtctagat
7601   tgctggcaat ggctttttta aatttaaatt gttattgaga taattgtaga
7651   ttcacatgca gttgtaagat atagtagaca taccctgtgt atactttacc
7701   caatttccgc aaaaggtaac attttgtaaa actatagtat aatatcacaa
7751   ccaggataat aatattgata cagctcacaa atctcattca gatttctcca
7801   gtttacttg aatacatttg tgtgtgtgtg tgtgtgtgtg tgtgtgtg ┌──────┐
7851   tgtgtattgg ctctgtacag ttttatcact tgcagagatt agtatatcta │D6S280│
7901   aaacaacaat caagatattg gacagttccg gccgggcacg gtggctcact └──────┘
7951   cctgtaatcc cagcactttg ggaggccgag gcaggcagat cacgaggtca
8001   ggagatcaag accatcctgg ctaacacggt gaaaccacgt ctctactaaa
8051   aatgcaaaaa attagctggg cgtggtggtg ggcgcctgta gtcccagcta
8101   ctcgggaggc tgaggcaggc gaatggcatt aaccagggag gtggagcttg
8151   cagtgagccg agatcgcacc actgcactcc attctgggca acagcgcgag
8201   actctgtctc aaaaaaaaaa aaaaaaaaa gatatcggac agttccattg
8251   tcacaaggat ctctcaagtt accccttgct aaccacatcc accttctcct
8301   tcacacttgc acaccccttc ccttctccag cctgaccca gcagccacta
8351   atctgttctc catttctgaa atgtttttat ttcaaaaatg ttatataaat
8401   ggaataatac agtgtataac tttttaagac tgactttct tgcactcaat
8451   ataattccct ggcaattcat ttatgttact ctgtgtatca atagttcatt
8501   cattttatt attgagtagc attccatggt atggaggcac cagagcttgt
8551   ttaaccatcc tcatggtgaa ggacatctgg gctgttttg gggtctggtc
8601   attatgaata cttcttctgt gaacattcat gtacaggttt ttgtacaaac
8651   ataagttttc atgtctctga cacgaatgcc caagagtaca attgctgagt
8701   catatggtaa ctatatgtcc agttttataa gaaacgacca tgctcagaag
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FIGURE 1D

```
 8751  gaccatactg ttttacattc ccatcagcag tgtttgaatg atccagcttc
 8801  tccgcatcct ccccagcatt ttgtgttgtc actatttttt gccactattt
 8851  tttattttag ccattctgct agctgtgtag tgataccatt gcgatctaat
 8901  ttgcattttt ctgatggcta atgatgtcaa ataacttttc atgtgcttct
 8951  ttgccatatg tgtaacttct tttatgtatg tcctctttta tgaatatcct
 9001  atttatacct ttgccaattt tctaattgag tttttggttt tttactgttg
 9051  agttttaagg tttctttaca tattttagat attagtcctt tgtcagatat
 9101  gtggtttaca aacatttttct cccagtctat ggcttgtctt ttcatcctta
 9151  gtacctgggc tctcacagag taagttttta cttttgatgg agtccaattt
 9201  ctcatttttt cctttataa cttctgcttt tgatgtcaag attaagaact
 9251  ctttgcttag tccaaatccc aaaaatatct ccattttttt cctaaaagtt
 9301  ttattatttt atgtttaatt tttaaacccg tggtccattt ttaaatgatt
 9351  atcataagat aggaagtata gattaaggtc cacttttttg cctatagatg
 9401  tccaattttt ccagcatcat ttgttgaggg cccttcttcc tccattgaaa
 9451  tgcttttgca cctttaaaac aaatcaattg agcatatttg tgtgggtcta
 9501  gttctgaatt ctctattctg ttcactgttc tatatgtctg tatgttccat
 9551  atgtctatcc ctccaccaat ccacagtctt gattactgga gctataatag
 9601  taggctttaa tatcaggtaa agtgattgat ctcgtttttat tcttctttgt
 9651  cagcattgtt ttagctattc caggtcctgt gcatttccat ataaatttta
 9701  aaataagttt gtatctaccc cccaaaaaaa actttgctga gattttgaca
 9751  ggaattttat tagacctgta gatcaatttg ggaagaattg acatctttgc
 9801  tatgatcagt cttccaattc ataaacacgg tatttctcct cacttattta
 9851  ggtctttttct gattttcttt atctgcattt cataatctca atgcacataa
 9901  accgtatgtg tttttctaag tggatatttta agttattttt atttggaatt
 9951  attataaata ataattttgt gtttctaatt ttcatttcca catgatcatt
10001  gttagtataa agaaatatga ttaattttta tattgatcat acatcgtgca
10051  gccttagtga actcacttgt ttcaagagtg tcttcgtaga tttcttggga
10101  tttttctgta gaccatcatg ccatttgtaa atagagacca ttttatgttt
10151  accttttccaa actgcatggt ttttttttctt ttatttggct tattgcagca
10201  actattaata taacttacaa tactatgttg aataagagtg atgaaagtat
10251  acatcttggt tgttcttaat gttggggaaa agcattcagt ctttcactat
10301  taagtatgat gttaagtttg ttgtaaatgc tatttatcga attaaactgt
10351  taaacctctt ttcctaactt gccaagagtt tttttttaatc ataaatgggt
10401  gttggatttt gtcaaatgct atttcgtcat caatttatgt gattttttttt
10451  tagcttttatt atataatgca ttatattgat tgatttcaac cattgagcta
10501  gccttgcata cctggaataa atcctacttg cctatatatt gactgattga
10551  ctgtttgcta atattttgct gaggatttttt tgtgtctaag tttatgataa
10601  atatgggtat gtagttttttg ttttgctttg ttttattgtc tttgtctggt
10651  tttggtgtca ggataatact gacttcataa aatcattgag aaagttttttt
10701  ctcctctatt ttctgggaga aattgtgtga aaatgatata ttcttattta
10751  aatgtctggt tgattttgcc agtgaaacca tttgacctgg acatttctgt
10801  ttggggagat tttaaactat gagttcaatt gctttagcgg ttatagggct
10851  acctagattg tctatttctt ctttgttgag ttttggtagc ttgtagtttt
10901  aaaggatttg gtccatttct tctaagttat caagtgtatg tgcgtaaagt
10951  taccatagta ctccttcatt ttttcagtgg cgtagaatct atactgatat
11001  cccctattac attcctgaca ttggggattt tcatcagctt tcaagaaaga
11051  gatttatcaa ctttattgat tttctcaagg aaccacttttt ttgtttcatg
11101  gattttccat attgttttcc tcttttcagt ttcattaatt tttgctcttt
11151  tctatgttat ttccttctat ctgcttcctt tgggtttatt ttacccttct
11201  ttttccaatt tcttgaggta ggtactcaga ttattaatat gagaactttc
11251  ttcatctaca atgtaagcat ttagtgctat aaattttcct ctcagcactg
11301  cttttactgc atcctacata ttttgttatg tcatttttttt attttcattc
11351  agttcaattt ttttaaaatt tttgagactt tctctttgac caatggacta
11401  ctgggaatat tgtttaattt ccacatgttt agagatttgc ttgttgtctt
11451  tctgttattg atttctagtt ttattccatt gtggcttgag aacacattct
11501  gtctgatttt attctttttaa acttgttgaa atttgtttat gacccggaat
11551  ataatctatc ttaataaatg tgcatgggtg cttttttaaaa atgtgtattc
11601  tgctgatgtt gggtgaaatg tctcatatca gtcagatcct gcaggttgaa
11651  tgtgttgttc aaatagttca catacttgtt aattttcatt ctagtagtgc
11701  tatgcccata gttctgagca aggataaggt gggttgatga agttcccaaa
11751  tacgacttaa catttgtcta ttttttccttt cagccctatt ggttttgctt
11801  tatgaatttt gagactgtct tgtcatttttc ccctcacctt cttaaaaaaa
11851  aaagcagcaa gcaatatttc tgaacaatag ggcttgaata aagaacttgt
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4 / 51

```
11901  aaatgtactt  tatcctgcct  tactgcagca  gaggaatagt  gcagtgacct
11951  tggcatacct  aagaacaatg  ggcatatatc  tgtcatttgt  taagaacaat
12001  ggacatattg  gtgtcatctg  tttccatgaa  aaagaaaaat  tactacacag
12051  tagtgttcgg  gggctcaggc  cacatttggg  attttcttgg  gatcccttat
12101  aatatgagta  ctcacaactg  gagtgccaaa  tgtcctggca  taagcaggaa
12151  ttaggggcag  ggattaaaaa  gtggatctgc  cattcaacct  aggttgggca
12201  caggcacaac  tacatgggca  tttgggcct  gagtatgttt  tccatatttg
12251  gaaagatgtg  ctggattaac  aagaaatgat  ctggcacttt  agatacctta
12301  ataaatgaac  agactcaact  acccagatat  acattcaaaa  ccaaaacaaa
12351  gccaaaatca  aacaaaacct  tcggattatt  aatgaatgta  tgttgaccct
12401  aattttggtt  atctgtgcat  aaagtcatct  ttgaaggttt  atcctataag
12451  taattttgaa  taactgtgag  taagcagtga  tgatattggg  tatttatttc
12501  ccatcatgag  aaatatttgt  ggattactta  gtgcaaaata  agagaaggat
12551  agaatgatat  agctctacta  ggcatttcaa  aagtgcagca  tatcatcaca
12601  tgctctaatt  aaagaaacag  acatttgcct  gaaatttgca  acaaaaatgc
12651  cacttttata  aatttggtaa  cagtttttat  cctgcgagta  agaatgggag
12701  aatggggagt  aggttagaat  gtttactttc  tctgctttgt  atttctgtga
12751  tgtttggaag  ttttaataaa  gacaatatat  tacttttaca  attaagctat
12801  tataacaaca  atctataaat  attgttctac  attataaatc  ttgaatcaac
12851  cctcgtttta  aaacaagaaa  gtgaattatt  ttttaaagga  aaaacaattt
12901  tgataaataa  agtgcctgtc  cctatagaga  cagcaaggtg  actgtgctaa
12951  gcttgctcca  gaaatgcttt  cgttttacaa  attccatttg  gtttttcatt
13001  ctatcatcga  ctgtttaatg  agccactcta  gctggccttt  ccccagggtt
13051  aactcacaac  tcttcctaaa  taatctcagt  cattttcctg  gagcaggtgt
13101  tgttttctag  gcagctcttg  ccaaagggca  gcataataat  taacaagctt
13151  cagatctgga  ggattcaggg  tctcatttct  ggcaaaggat  atgtgtgtca
13201  cactgtaatg  cttttgaaac  ttactgtttt  ataaggagat  tttgacactg
13251  taacgaaaga  attcagtata  cttcgaaata  tttgcttctt  tttctctaag
13301  aacaactctc  gaagatttag  agattatgtc  actccttgca  gcaaaatgaa
13351  gctctatttt  ctgtaaaact  tgccattata  tttcaggatc  gctattttat
13401  ttcagatatt  tcacatgtta  ctgggtagct  aaagtcagct  acactataaa
13451  ttccagacga  gacagatcca  ttattcagcc  tgcacattta  gtattgaaac
13501  tgactcccaa  atttacgaag  cattaatgac  ttgaaaagga  atagcattcc
13551  atgataggaa  atgcagacag  tatgaggttc  aaatgctgtc  cagatttagt
13601  ttgatctgga  gaaaggaaat  gttcttaact  ttagatatta  acaactagat
13651  cctttagaca  aagtgcctaa  atgtccaaaa  atatgcatag  agcttcttac
13701  tgtggtttgc  tccataatgc  ttctctctga  tatgtcttat  ctgatatttt
13751  agGAGTTCGT  GATGATTGTC  GTCTTTGGTT  TGGAGTTCAT  CATTCGAATC
13801  TGGTCTGCGG  GTTGCTGTTG  TCGATATAGA  GGATGGCAAG  GAAGACTGAG
13851  GTTTGCTCGA  AAGCCCTTCT  GTGTTATAGg  tgaatatcag  agtctcagat
13901  acctggacta  tgacaccaac  attcttgtct  tctatctcct  gttttgcaat
13951  atttgattaa  tattaaaagc  taacatccat  ggagtactta  tcatggaccg
14001  ggcactcttg  tgtcttgaaa  atgttgactc  atttgatgtt  gtctccacag
14051  cattatgagg  tagatatttt  tattatcccc  attttacagt  tgaagaattt
14101  gagacaaaga  gagacggagt  tagttgctga  atgtcataca  gctactaagt
14151  ggtagagctt  gaattttagc  caggcaatct  ggctctagaa  tacccactta
14201  tatcaattaa  cttatatgga  aatacatgtt  tctccagtgt  tgccctaatt
14251  taggggaaca  ttgatttcag  tgagtataaa  aaacccttt  tgctctacaa
14301  tatgacacca  gtttatgctc  tggatcagct  ggaatagata  gccatacatt
14351  ggtactggta  atgcatatca  attaacattc  ttcaagaatg  attataagta
14401  tggtttgctt  aatgcattgg  taactgtaga  ctggacaaag  tgctctacac
14451  tctgaaatat  gaatccccca  ccctccaatc  caaaataccc  aaatacatag
14501  cacatctctg  caccteccta  gctgccattg  tttctgagag  acatcattca
14551  cctgggttct  agcttgaaat  tgtacttcct  aatgaagatg  ccatagagca
14601  ttctggaatt  aagatctagc  atttcccagt  aatatttaaa  agtattataa
14651  aatggaaaag  tctatatata  aaagctatta  ttattattat  ttagtagcta
14701  aatttggctc  tcttgctttt  ttgtctttct  cacttcctag  gcagccattc
14751  aaatccaaat  actgaaaatt  cttgatgagg  cttatttatt  tcaactattt
14801  tcaacctgaa  aaagtaggt  tttaatttac  aaaatagttt  aggctatctt
14851  ctacagctac  cacaggtttt  ctgtttttgtt  ttaggagtca  ggaattgttg
14901  cgtaatcttc  tcagtttcct  cccttactcc  tgttccctat  ggtgggggca
14951  gagtggattt  aaggaagaaa  gtgtatcacc  atccatgggc  actgttaaga
15001  agaatccttt  attccatact  tctttcatag  tatgcacatc  tcaaaagtct
```

Exon 3(D)

```
15051  ccacttatta aaccagaatt tatggaaatg tggctgtgtg tgaggcactg
15101  gtgttacaat agtgaatcta gtggaattct cagttaaatc tatcttaaaa
15151  taccttgttt ggccctcacg aatgcagtct gtttgtctgt cttctccaat
15201  aataggcttt actgcttttt ggaagccatc atgctaaggt atggagcaaa
15251  gtcggtggta actccaagcc ttgcaggttc ataaagcccc aaggcatatt
15301  agtgaaggca ttagattttt ctccctggag atgctttttt ctctctgaat
15351  tctctactca ggcagcatta caaaggactg taacctgatg tgaaactact
15401  gcacaacaag tactttctgt cccataaggg gcccaaacaa aacaattcac
15451  aaggcagatg gttagccaag attcactcaa cttctacagg ataaggtcag
15501  ttcatggatg actggaaaaa tgtttcattc cagatttta aaccaattaa
15551  aaattggttt tgttccaatt tcagaagcaa tgccaatgta tctctggcct
15601  ccatgcgaaa aagaaagctt tttcccagat gtctgctgcc ttttgatagc
15651  tgttttcagc tacggataca tcaacacatc ttagtccttt agtctttctc
15701  ttcctgcctc agatccttgc aggtcttgat ataatatgta gttctaaaaa
15751  tgatgttatg ttatctataa tcttacttgc ctttggatgt atcaatagtg
15801  accttaaaaa tttagtatga tgcctggcgc agtcactcct gcctgtaatc
15851  ccagcccttt ggaaggctga ggaaggcaga tcacttgagc ccaggagttt
15901  aagaccagcc tgggatggaa agacctgtct ctacaaaaat ttaaaaatta
15951  gctgggcatg gtggcataca cctgtagtcc cagctactca gaaggctgag
16001  actggaggat catttgagcc caggagtttg aggctgcagt gagccatgtt
16051  cctgccacta cactccagcc tgagtaaaaa gagtaagacc ctgtctcaaa
16101  aaaatactag tatgacatgg tttacgcata attgcagttt tgttaaccct
16151  tcagaccttt tctttattta gatattttac ctctaggaaa ttaattgctt
16201  tggaagaaaa tttcatggat aaatatataa tgaatcccca ttagaacaaa
16251  gtctagattt gtacttacag ttaggataat tatgaatttt ttagtctttt
16301  attaaatgta catgtttgac ccatggtcca gctgaatgga tgttatagtg
16351  aagcatgttc aaatgtggct tatcagtatg aggtcagtaa aatttaacct
16401  acacaaagga atcaaacatc accttcctga aggcagcaag ctgtaccaga
16451  tgactgttga gactatttct aggcccgttc aacaggttca taaaaacgct
16501  tgatgtaact ggtaaaatac taaagtgaac actgtagtcg ccttgttcaa
16551  cctaatttac tgtgacaaaa tgaaaaaaga aatagcatct cttatctgtc
16601  cctgataact gttctgaatg ggtgtttgga aatatagcta aaacctccca
16651  aaacttcatg tatttgtaag atttgattac tctgaacatt ccaagtacac
16701  acccaaatat ttttagaagt gttgagcatt cgagaaaaga acatagaaaa
16751  gattgtggta gactggctgt gccttcaacc tgggaaatgc tttctgtaag
16801  cacaccaatg ttttctttc cagttggaaa tacactgaag ctgctagagt
16851  ggtcagctaa caagccccat gtactattgc accctattga caaaggccca
16901  attgatagag gttttatggg ctaattactg aaggtttag catgtcccct
16951  tctgaactgc ccaccttcct tacccctgca ctctagccaa aaccaagagc
17001  atttcaaaag cccactgatc tcacaaatcc taaaatcatt acatatttgt
17051  gtttggaaaa catattttaa acaattataa cataagggaa gaaataaatc
17101  tatttaactt tttttaatta ggtactttgt ttcattacta ctgtacattg
17151  atgtatgtct gcttggtttt aagcatttgc tttgaaaatt agtaaaatct
17201  tatctagaac ataaaattct tcctcatatc tatgtgttca atttttatct
17251  ctcccctaag actcttctgt cataataaca ttctatagct atgagcacta
17301  attgctgtat tgctgatgtg gatagtcaag tgtgtttttgg gatgaccacc
17351  caagcagccc ttcatttacc cagactggct gctttatgat ttctctatgt
17401  gaaaacacaa aacactcacc caataacatc ggcataaaga atttgtgaat
17451  aacctctaag actgatttca tagtcattct tttttctagc tttcattact
17501  gacctaccca aaaattgcaa atagacctaa ggctgaaact tggatcacaa
17551  taatgagcct gatgtgtcag gaagccaaca aattacttct cacagtggct
17601  ttttttagat tccttggtga cgctttccaa aggcagatat aacagggcca
17651  tatttttcag tcttgcaggg agtctcagtg agaaaatacc agcctgttgt
17701  tagtcttgga tctgcatttg atgctaagtg taagttgatt tcttattgtt
17751  attttaacag tttattttca gtgtaattat ttccacaaga ggacaaaaga
17801  ggaataaaat aaaattttat tttatcctac gtggataaaa taaaattgaa
17851  gcctttatta aaatcgacca catggctgag actactctaa tatatctatg
17901  atttcatctt attaaaaggc aacttaagtt gctaatgtgt tcaaaagtta
17951  gatcagactc ccaaaactgc cactgtgttc taaattgatt ttgagacatc
18001  attttttctgt ttctctgtct tctctatctt ttgttctaag agacttactc
18051  ttcaatggca ttattttcta taccttctac tcccttttcc ctttagtaga
18101  aattatatta tttcacttat tttctgttag tcatacactc ttctgcaact
18151  tattacttct aagtgttcaa actccctcag tgcatgtaga ttccttccat
```

FIGURE 1G

```
18201   gtgattaact   ggaccatctg   aggacaatta   aaacctgttg   gattggctga
18251   tcacaaaaca   ttaaaacaat   tttaatccct   ctagttagta   atagctgata
18301   tttattgaga   actactatat   attaggtact   actttaagca   ctttataaat
18351   atggtcttat   ttaattctac   ataagtacta   taatgtcctt   atttatttta
18401   ttttatttta   ctttacttta   ttttattcta   ttttatttta   ttttatttta
18451   tttattttta   ttttatttta   ttttatttta   ttttttgagg   cagagtttcc
18501   ctctatcacc   caggctggag   tccaaatggc   atagtctcag   ctcactacaa
18551   cctccgcctc   ctgggttcaa   gccattctca   tgcctcagcc   tcccgagtag
18601   ctgggactac   aggcacacgc   caccacaccc   agctaatttt   tgcattttta
18651   gtagagatag   gatttcaccg   tgttggccag   gctggtcttg   aactcctggc
18701   ctcaagtaat   ccacccgcct   cagcgtccca   aagtgctggt   attacaagtg
18751   tgagccacca   cgcctggcct   ttataatgtc   ccattttata   gatgaggaag
18801   taagacaaga   ctgaagactt   tatagatgag   gaagcaagac   aaacttaaaa
18851   agatgatagg   tgaaagaacc   tggatttatt   tctcatgatt   tcactctaga
18901   aaaatataca   tacccaactg   gaaaattgtc   tttactgttt   attagcattt
18951   taaaattaaa   tttaattgaa   ccttatctat   tgtcatcaac   ttgtaaacag
19001   aagaacatga   tactattatg   cttatcatta   gtaattcaag   atctttaaag
19051   aaaagccagg   ctttatagaa   cattaattgc   agtatcagcc   ttaattatat
19101   caactaaatt   atgttaccta   ttgctgctct   ctaacctgaa   tgggaaatta
19151   ggacctaaaa   tagacttact   tacctgtatc   aaacttgcat   atactcttca
19201   gttgttgtta   tcatgaggct   ccctgtgtat   ttccaaattg   gagacctctg
19251   gagagcaagt   aacattactc   gcaggactac   cttcaaatgt   tttttaacat
19301   taataaacta   tcggtaattt   agataattgt   tgacctggta   cacaaacttg
19351   aaagttgaac   ttacaagaca   gcttgattag   ctgatatggt   tggaccacat
19401   gaagaaaatt   tatttccgaa   gaggaaaatg   aataaggatt   atttcccact
19451   ctttctataa   actttagtag   agcactatga   tatactgtat   taacattctg
19501   tactatcaca   tgttacataa   gaaaattcat   tcacagacag   ggtatttatt
19551   atgtgtcaaa   cataatctta   agtataaagg   atacaaaagc   gactaaaaca
19601   cggtccctgc   ctgtaagaat   agaatctcct   gtgcccttag   agaatggcaa
19651   aacttaaagg   aggtatacta   taattatggt   gttacagagc   aaaggtgatg
19701   gaaattgaag   tagtcctaga   aagaaggcta   tggaatatca   tgagtgattg
19751   tataaaacaa   agaagcaaag   gactacccc   aggttttcaa   attatgtttg
19801   agtcatccac   tgaacattta   tacaatttct   accatgtcca   agcatgctta
19851   tggatgctgg   agaggctgta   tggcaccaaa   tgggcaaggt   cttccttctt
19901   atagagataa   tattcgtgtg   gacaaagaaa   aacaatacac   aaatatgttt
19951   ttgaaaaaca   agataatgtc   atctacagat   aagcacaatg   aagaaaataa
20001   aacagaaaga   gtagaggcta   ccttagcttg   ggtggtctga   gaaagtcttt
20051   ctaagtagtt   gacacttgag   ttgacctgaa   tattaagaag   aagccagcca
20101   tgaggaggtt   tagacacaga   tctttccagg   ccagggaata   gtaattgcaa
20151   ggattattaa   cacttgatga   gcttggggttg   tacaaggtgg   agacataagg
20201   tctcgtggct   ggagctcaat   gagcagtggg   gagaatagca   gaaggtgata
20251   ggggagacag   gcagaggtca   caccctgaag   gccatgtagg   ctctgctacc
20301   ctgaatcaag   gttccttcta   aagacaggcc   accaggcaaa   ggtcctacgg
20351   gttgctggca   ggcctaatat   gaatactatt   caggttatga   acagcagcat
20401   taatcaggca   acaaaaagta   tggctgttta   atgccctggg   ttttttagtc
20451   atgtatgcct   gttggaactt   catatcagca   atatacaaat   tattacccat
20501   ttatgtttat   aaaaaacata   aacataagtt   tataaggaaa   taatcctctg
20551   aattttgttt   ctatatttct   gcccttagaa   acatgaaatt   ttacattgtt
20601   ttttaaaatg   ttattttttct   atgaggaact   ggaattagaa   tgtgatggaa
20651   acttttttac   agccccagtg   gtatcaccag   taagcagttc   ctaagatcct
20701   ccttgccaag   ggactctatt   ccatactctt   agttatgatg   attgcagtgc
20751   agaattattt   cattaaagat   tgtttatttc   ttttgagaaa   ttgtcccttt
20801   ttgccttgag   atgttatctg   aaactgtatg   atcaataaga   agcattaaac
20851   tgtcactatg   gggtaaattt   tcaaagtggt   gcctgcaatt   tgccagtatg
20901   agtcccatta   acttctgtgg   aagtcctgca   gttaaacccc   tgcacatggc
20951   tttgaaaatg   ttctacaagt   ttgtctttgt   ggtgcctttt   ttatttttaa
21001   taaatatcac   agagcaactc   agtgcatagt   tgattgcagt   atttaagaac
21051   gtggataatg   tactgtgcag   gaggagactt   ttaaaattag   attttaaagc
21101   ttcatttcta   ttaagagtca   caacaacaat   ataaatacat   ctttagttct
21151   tcaaagagca   cctttctata   aaggaatttg   gagctcaatt   agaatataga
21201   gcttataaag   cagcaccatg   tccctctgag   acattgttta   cttcactcta
21251   tagatggaaa   agtcgaggca   ctgtgaagtg   ggggtgcttt   gtccttagcc
21301   cataaatcag   cagtaaagct   aggaatagca   tgctggcctc   ccaatagctc
```

FIGURE 1H

```
21351  attgctctaa  agcactgcct  cttgttagag  tcaaatttaa  ttatagtata
21401  atccgtttaa  tctacatgtg  gagaaataat  gaaggagcag  gaaaaatgaa
21451  tttcttaaca  gatcagtgga  aaaccatatt  acatagatta  gcaactgtct
21501  tttcaagatc  cgtattttcg  gcatgtacta  gatggtatct  gatgccatga
21551  aagcaaatat  tctaattcca  ctggccagaa  ctggcaaaga  acttcttatt
21601  ttcctcactt  tgaaacataa  gtaaaggggt  tccacttgaa  aattaataag
21651  ccatgtgata  tgattcgatt  cctgtcccca  aatctccctc  cttctagggg
21701  ccattgtcta  aagtctaaaa  gaaaacatac  caggcacagt  ggctcatgcc
21751  tgtaatccca  gcactttaaa  gggagagcaa  ggtaggagga  tcacttgagc
21801  ctaggagttc  aaaatcatca  acctgggcaa  cataatgaga  ccctatctct
21851  acaaaaaaaa  caaacaaaaa  caaaaacaaa  caaaaaaaac  tgtaatagct
21901  gggtgtggtg  gaacacactg  gtagtctcag  ctactcagga  ggctgatagg
21951  agaaggtaac  ttctgcccag  gaattcaagg  ctgcagtgaa  ttatgattgc
22001  accactgtac  tgcagcctgg  gcaacagagt  aagacagaga  gagagaꞇaga
22051  caaagagaaa  ggaaggaagg  aaagaaggaa  ggagggaagg  aaggaꞇꞇgaa
22101  ggaaggaagg  aaggaaggaa  ggaaggaagg  aaggaaggaa  gggaagaagg
22151  aaggaaggga  gggagggaag  gagggaggga  aagaaaggaa  aggaaagaaa
22201  ataaatgtaa  ctattataaa  agatgttcaa  tgttttattt  tggaataact
22251  ttagacttac  ttagaagttg  caaaaatagt  acagaatttc  catgttcaaa
22301  tgtactcttt  acctaacttt  ccccaaaata  ttttacctac  gtatactgca
22351  attatcaaaa  ccaggatatg  aatacatact  attagctata  gtctttattt
22401  gaatttcacc  agttttttaca  tgcgctcaat  ttttatatac  actcctataa
22451  aattttctca  catgtatata  tgcatttaac  caccaccaca  atcaaaatac
22501  aaaacttttc  catcacccta  aataaacttg  gaatgatata  ctttgtatta
22551  ttcctttaca  ggtactccct  ctcttcaatc  ctaacctctg  ggaaccacta
22601  tatctgttct  gtttcactgt  aattttgtca  ttttataat  gttatataaa
22651  tgaaattgta  aagtagtaat  cttttgaaat  tggcttttttc  ttacacagca
22701  tgatgctctt  gagatccatc  caagtgcatc  aatagtgcat  tcctgtttat
22751  tgcttaatag  aattccatga  tctagatgta  acacaatttg  tatattcatt
22801  tacctaatca  aggtcatttg  ggctgcttct  agtttttggc  tattacaaat
22851  aaggcagcta  tgtacattca  tgtgtaggtt  tgtgtatgaa  cgtaagtttt
22901  tatttctcta  gggtcatata  gtgctagttc  acctttatca  gaaactgcca
22951  aactatttcc  ttttaaaata  tagaaatgcc  aatgcaaaca  tgtgcatgga
23001  ggtcagcagc  cccaccccct  gccccacgct  gccactgctg  ccagtgtgaa
23051  catatgcatg  gaggctggca  gccccacgct  caccactagc  ctgcccctgc
23101  actgacactg  ctaccagcat  gagcgtgcac  atggaggccg  gcagccccat
23151  ggccaccagc  actctgcccc  agttgatgag  cattcacccc  accacactgc
23201  cacttgctct  tggcactgct  cttggcactt  acaaatgagc  acagatcctg
23251  ctgccaccac  cccaacaaag  tggtttggct  ggcaccaccc  atcagagtat
23301  tgtggccaga  ggtgcaggaa  caccttagcg  cctccacttt  agcagtttcc
23351  taacctcaag  gggccagaga  ataaagtcag  agatccagta  acagcctccc
23401  aaagttgcag  catacagccc  aaaagttctg  agctgagcct  tacccctaa
23451  attcttccag  aaatgaagcc  agtcaactga  acccacctta  tatgagattc
23501  aaaccttcca  gggcatcaaa  gaagatagag  gcaaaaaaaa  aaaaaaaaaa
23551  aaaaaaacta  tccaaaggac  agcaatttca  aagactgaag  gaaaatcagc
23601  ccacacagat  gataaagaac  cagtgcaaga  gctctggcaa  ctcaaaagtc
23651  agagtgcttt  cttacctcca  aacaactgca  gtagttcccc  agcaatggtt
23701  cttaaccagg  ctgaaatgac  aaaaagagaa  atcagaatgt  ggataggaac
23751  agagatcact  gagattcagg  agacagtgaa  aacctaatcc  agggattcta
23801  aggattacaa  caaagtgata  caggagatga  aagacgaaat  ggccacttta
23851  agaaagaaca  gaactgatct  gatagagctg  aaaaactcac  ttcaagaatt
23901  ccagaataca  atcacaaata  taacggcaga  atcgatcaag  ctgaggaaag
23951  aatctcagag  cttgaatatc  gcttctctga  ataactcag  tcagacaaaa
24001  ataaagaaaa  aaagattaaa  gaagaatgaa  caaaatctcc  aaagtatggg
24051  attatgtaaa  gacaccaaat  ctatgactca  ctgatgtccc  tgaaagagag
24101  ggagagaaag  caagcaactt  ggagaacata  tttcaggata  tcatccatga
24151  aaattccccc  aacttcacta  gagaggccaa  cattcaaatt  gagaaaatgc
24201  agagaaccct  tgtgagatac  tatacagata  accatcccca  agacacatac
24251  ttgtcagatt  ctctaaggtc  aaaacaaaac  aaaaaatgtt  aacagcagct
24301  aaagagaagg  ggcaggccac  ctcccaagga  aaccccatca  ggctaacagc
24351  acacctttca  gcagaaactc  tataagccag  cagagattga  ggacctatat
24401  tcagcattat  taaagaaaag  aaattccaaa  caagaatttc  atatccagcc
24451  aaactaagct  tcataaatga  aggagaaata  agattctttt  caggcgagca
```

FIGURE 1I

```
24501  aatgctaagg gaattcatta ccatcagacc tgccttataa gaggtcctaa
24551  agagagtgtt aaatatggaa aggaaagatt attactggca actacaaaaa
24601  cgtgcttaag tacacacacc attgatgcca aaaagcaacc acacaaacag
24651  atctgcataa taaccaatta acaacacaaa acaggatttg atccttcaaa
24701  tccacacata tcaatattaa ccttaaatgt aaatgggcta aatgcccaat
24751  taaaaggcac agagtggcaa gttggacaaa gaagcaagac ccaacagtat
24801  gctgtcttga atagacccat ttcacatgca gtgacgcaca taggatcaaa
24851  ctaaagggat ggagaaaaat ctaccaagca aatggaaaac agaaaaaagc
24901  aggagttgct attctacatt caaacaaaac agactttaaa ccaacaaaaa
24951  tcaaaaaaga taaagaaagg cattacataa tggtaaaggg ttcacctcaa
25001  aaggccagac ttaactatcc taaatagata tgcatccaaa acaggagcac
25051  ccaaattcat agagcaagtt tttagacacc cacaaagaga tttagataac
25101  cacacaataa tagtgggaga ctttaacatc ccactggcag tattagacag
25151  gtcattgagg cagaaaacta acaaagaaat tcaggacctg aatttgacac
25201  ttgactaaat agacctaata gacatctaca gaaatctcca cccaaaaaca
25251  ggagtgtata tattcttctc atctgcacat ggcccataat ctaaaattga
25301  ctaatcagcc ataaaacaat ccttagcaaa taaaaaaaaa tcataccaac
25351  cacactctca gactacagtg caataaaaat agaaattaat ggaaattaac
25401  ctgcttctga atgacttttg ggtaaacaat gaaattaagg tagaaattca
25451  gaaattattt gaaactaatt agaacaaaga tactacatac cagaatctct
25501  gggacacagc taaagcaata ttaagaggga agtttataga gctgaatgcc
25551  tacatcaaa- agttagaaag atcttaagtt aacaaccgaa catcacacct
25601  agaggaaat- gagaaacaag agcagatcga ccccaaagct agtagaacac
25651  aagaaatcaa aatctgcact aaactgaagg aaattgagac gcaaaaaaac
25701  atacagaaga tcaatgaatc caggacttgg ttcttcgaaa gaataaataa
25751  gatagataaa atgctagcta gactaataag gaaaaaaaga gagatcaaaa
25801  taaacacaat cagaaatgac aaagggatgt taccacctac cccacaaaaa
25851  tttaaaaaac cctcagagac tactaaaaac acctctatgc acacaaacta
25901  gaaaacctag aagaaatgga taaattcctt gaaacataca accttccaag
25951  attgaaccag gaagaaattg aatcctggac agagaccaat aatgagttcc
26001  aaaattgaat cagtaataaa aagcctacca accagaaaaa gcccaggacc
26051  agagggattc acagctgaat attacaagaa gtataaagaa gagctggtac
26101  cattcctact gaaactattc caaaaaacag aggaggaggg actcctccct
26151  aactatgaaa ccagcatcat cctgatacca aaacctggca gggacacaac
26201  aacaacaaaa aacaaaactt caggccaaat ccttgatgaa catagatgca
26251  aaaattctca ataaaatcct agtgaaatga atccagcagc acatgaaaaa
26301  gctaatccac cactatcaag gaggcttcgt ccctgggaca caagtttggt
26351  tcaacatata caaatgaata aatgtgattc atcacataaa cagaattaaa
26401  aacaaaaacc acatgatcat ctcaataaat gcagaaaagg cttttgataa
26451  agttcaacat cccttcacgt taaaaacct caacaaacta ggcactgaag
26501  gaacatactt caaaataata agagccatct ataagaaact cacagccaac
26551  atcacagtga atgagcaaaa gctggaagca ttcttattaa acaccagaac
26601  aaaacaagga tgtcctctct caccagtcct tttcaacata gtactggaag
26651  tcctggccag agcaatcagg caagagaaag atataaaagc catctgaata
26701  gagggaagt caaactgtcc ctgattccag tcagtatgat tctatgccca
26751  gaaaacccca taatctctgc tccaaagctc cttggtttga taaacaactt
26801  cagcaaagct tcaggataca aagtcaatgt acaaaaatca gtagaatccc
26851  tgtgcaccaa caacatccaa gctgagagcc aaatcaagaa tgctatcccc
26901  caagcctgcc acc̲a̲t̲g̲g̲c̲c̲a̲ ̲c̲c̲t̲a̲c̲a̲a̲a̲c̲t̲ ̲g̲g̲t̲g̲c̲a̲g̲a̲t̲c̲ ̲c̲a̲g̲c̲a̲c̲a̲g̲c̲g̲
26951  a̲g̲a̲g̲t̲g̲a̲g̲t̲g̲ ̲g̲a̲a̲c̲t̲g̲g̲a̲g̲ ̲a̲a̲c̲c̲a̲c̲t̲t̲c̲a̲ ̲g̲c̲g̲g̲c̲t̲g̲g̲t̲a̲ ̲c̲g̲a̲c̲g̲c̲c̲a̲t̲c̲
27001  c̲t̲g̲a̲g̲c̲c̲c̲a̲g̲ ̲c̲g̲g̲g̲c̲c̲a̲t̲g̲a̲ ̲g̲g̲c̲g̲g̲c̲a̲a̲a̲g̲ ̲c̲a̲g̲g̲c̲a̲c̲t̲g̲c̲ ̲g̲a̲g̲a̲t̲g̲c̲t̲g̲g̲
27051  c̲t̲a̲t̲g̲a̲g̲t̲t̲t̲ ̲g̲a̲c̲a̲t̲c̲t̲g̲c̲t̲ ̲t̲c̲a̲c̲c̲t̲c̲a̲t̲t̲ ̲g̲c̲a̲g̲a̲a̲g̲a̲g̲a̲ ̲g̲c̲g̲a̲t̲c̲c̲c̲g̲a̲
27101  c̲c̲t̲t̲c̲t̲g̲g̲a̲c̲ ̲a̲g̲t̲g̲c̲t̲a̲g̲a̲t̲ ̲g̲c̲c̲a̲t̲t̲g̲a̲t̲c̲ ̲a̲g̲a̲t̲g̲t̲a̲g̲c̲t̲ ̲g̲c̲c̲a̲a̲t̲a̲g̲t̲g̲
27151  a̲g̲g̲a̲c̲t̲t̲g̲g̲c̲ ̲g̲c̲c̲t̲c̲a̲a̲t̲g̲a̲ ̲g̲c̲a̲g̲c̲a̲c̲t̲a̲t̲ ̲g̲g̲g̲g̲c̲t̲c̲t̲a̲g̲ ̲c̲c̲g̲g̲t̲c̲t̲c̲a̲a̲
27201  t̲a̲a̲a̲g̲c̲a̲g̲a̲a̲ ̲a̲c̲t̲g̲c̲t̲g̲c̲a̲a̲ ̲a̲a̲c̲a̲t̲a̲g̲t̲g̲a̲ ̲a̲g̲c̲c̲c̲a̲g̲g̲t̲g̲ ̲a̲a̲g̲a̲t̲c̲t̲g̲c̲a̲
27251  g̲g̲t̲g̲c̲t̲c̲c̲t̲a̲ ̲t̲g̲a̲t̲g̲t̲c̲c̲c̲a̲ ̲c̲c̲a̲c̲c̲t̲c̲c̲g̲a̲ ̲t̲g̲g̲a̲g̲c̲c̲c̲t̲a̲ ̲c̲c̲a̲t̲c̲c̲t̲t̲t̲c̲
27301  t̲a̲c̲a̲g̲c̲a̲a̲c̲a̲ ̲t̲c̲a̲g̲t̲a̲a̲g̲g̲a̲ ̲t̲c̲a̲c̲a̲g̲g̲t̲a̲t̲ ̲g̲c̲a̲g̲a̲c̲c̲t̲c̲a̲ ̲c̲a̲g̲a̲a̲a̲a̲t̲c̲a̲
27351  c̲c̲t̲a̲c̲c̲c̲t̲c̲c̲ ̲t̲g̲t̲g̲a̲g̲a̲g̲t̲c̲ ̲t̲g̲a̲a̲g̲g̲a̲c̲a̲c̲ ̲t̲a̲t̲t̲g̲c̲c̲a̲g̲a̲ ̲g̲c̲t̲c̲t̲g̲c̲c̲c̲t̲
27401  t̲c̲t̲g̲g̲a̲a̲t̲g̲a̲ ̲a̲g̲a̲a̲g̲t̲a̲t̲t̲t̲ ̲c̲c̲c̲c̲a̲g̲a̲t̲c̲a̲ ̲a̲g̲g̲a̲g̲g̲g̲g̲a̲a̲ ̲a̲t̲g̲g̲g̲t̲a̲c̲t̲g̲
27451  a̲c̲t̲g̲c̲a̲g̲c̲c̲c̲ ̲a̲t̲g̲g̲c̲a̲a̲c̲a̲g̲ ̲c̲c̲t̲c̲t̲g̲g̲g̲g̲c̲ ̲a̲c̲t̲g̲a̲c̲a̲a̲g̲c̲ ̲a̲t̲c̲t̲g̲a̲a̲g̲g̲g̲
27501  t̲c̲t̲c̲t̲c̲t̲g̲a̲a̲ ̲g̲a̲g̲g̲c̲t̲a̲t̲c̲a̲ ̲t̲g̲g̲a̲g̲c̲t̲g̲a̲a̲ ̲c̲c̲t̲g̲c̲c̲a̲a̲c̲t̲ ̲g̲g̲c̲a̲t̲t̲c̲t̲c̲a̲
27551  t̲t̲g̲t̲c̲t̲a̲t̲g̲a̲ ̲a̲t̲t̲g̲g̲a̲c̲a̲a̲g̲ ̲a̲a̲c̲t̲t̲g̲a̲a̲g̲c̲ ̲c̲c̲a̲t̲c̲a̲a̲g̲c̲c̲ ̲c̲a̲g̲c̲c̲c̲a̲c̲g̲c̲
27601  a̲g̲t̲t̲c̲c̲t̲a̲g̲g̲ ̲g̲g̲a̲t̲g̲a̲a̲g̲a̲g̲ ̲a̲c̲c̲a̲t̲c̲t̲g̲c̲a̲ ̲a̲a̲g̲c̲c̲a̲t̲c̲g̲a̲ ̲a̲g̲t̲t̲g̲t̲g̲g̲c̲t̲
```

Phosphoglycerate mutase, processed pseudogene

FIGURE 1J

27651	**gcccagggca**	**aagccaagaa**	**gtga**aggcca	gcaaacaggc	accctccctg
27701	cccattgcat	ccatctgtcc	ctccctcctg	aacatgtcac	actgaccaca
27751	tctatagaca	tcttgagttg	cagctgcaga	tggggaccgg	tggctcccat
27801	tttcatttta	gccattttgt	cttctgcacc	cactcccttc	atacattcta
27851	gtcagaatag	cacttctagg	gcacaggttc	tcagtctaag	ctgtggaaaa
27901	gcccccgtta	tccaagagag	ttcaaagata	gtgacttggg	tttttgcaag
27951	tgctttgttt	actaaggact	tgtgaggagg	agccatgctg	agctacgacc
28001	aatgaggaga	agcaagagag	cctgtctgcc	cccaggagct	agtcctgtgc
28051	ttgtctgtag	tcaggccact	gcctgggggc	tctagtcatc	ccagtggaag
28101	atgaatgtaa	cctgcatggt	gatgtgacag	ctgtttcctc	cctgacccca
28201	ttacatttac	ttttatttaa	aaaaaaaaa	gtatagtgta	tataaataat
28251	acaaaacaat	aacccttcta	agggtttctc	gtggtggttg	aaatagtccc
28301	acatgtggtc	atcagaacat	aagccattcc	tcataccaat	atggggtaag
28351	ctccttgacc	tttgaggggc	aggagtgctt	catgctgtgt	gttttagaat
28401	ccctccctgc	cttgtttcat	ggcagtgaaa	tgcctcttgg	tcctctccaa
28451	gtgtgttttt	cactgatttc	tgaatcatgt	tgcagttgct	tggccctgcc
28501	acataggtct	agtgttcatt	tgagcataac	tgtactaaat	ccttttttcca
28551	gatcagtata	ataaaggagt	gatgtgcaat	aaaaaaaaga	atgccatccc
28601	atgcacacca	gttagaatgg	tgatcattaa	aaagtcagga	aacaacaggt
28651	gctggagagg	atgtggagaa	ataggaacat	ttttacactc	ttggtgggac
28701	tgtaaactag	ttcaaccatt	gtggaagaca	gtgtggtgat	tccttaagga
28751	tctagaacta	gaaataccat	ttgacccagc	catcccatta	ctgggtatat
28801	actcaaagga	ttataaatca	tgctтттata	aagacacatg	cacatgtatg
28851	tttattgcag	cactattcac	aatagтaaag	acttagaacc	aacccaaaag
28901	tccatcaetg	atagactgga	ttaagaaaat	gtggcacgta	tacaccatgg
28951	aatactatgc	agccataaaa	aaggatgagt	tcatgtcctt	tgcagggaca
29001	tggatgaagc	tggaaaccat	cattctcagc	aaactatcac	aaggacagaa
29051	aaccaaacac	cacatgttct	cactcatagg	tgggaattga	acaatgagaa
29101	cacttggatg	cagggtgggg	aacatcacac	actggggcct	gtcatggggt
29151	ggggggaagg	ggggagggat	agcattagga	gatataccga	atgtaaatga
29201	caagttaatg	ggtgcagcac	accaacatgc	cacatgtata	catgtgtaac
29251	aaatctgcac	attgtgcaca	tgtaccttag	aacttaaagt	atagtaaaaa
29301	aataaataaa	taaataaaaa	tttaaaaaat	gaataaaata	catagaaata
29351	cagctaacca	ggtaggtgaa	agatctctac	aacaagcatt	ataaaacact
29401	gctcaaagta	atctgagatg	atataaacaa	aaggaaaagc	attccatgct
29451	catggatagg	aagaagcaat	attgttaaaa	tggccatatt	gcccaaagca
29501	atttacagat	tcagtgctat	tcctatcaaa	ctaccagttc	ttcacagaat
29551	tagaaaaaaa	aattatttaa	aaatttgtat	gaaaccaaaa	aaaagcctga
29601	atagccaagg	caattctaag	caaaaacaac	aaagccagaa	gtatcacatt
29651	gtgtgacttc	aatctatatt	acaaggctac	agtaaccaca	acagcatggt
29701	actggtacaa	aacacataga	ccaatggaac	agaagagata	gcccagaaat
29751	aatgccacac	acaaaccatt	tgatcttaaa	caaacctaac	aaaaacaagc
29801	aatgggaaaa	gaaattccta	ttccataaat	ggtgctggga	taactggcta
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29901	aatcaactca	agatgggtta	aaggcttaaa	cataaaacct	aaaactggcc
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30251	aaaaaccctg	gaagatgacc	tgggaaatac	cactctggac	atataggacc
30301	tggcaaagat	tttatgacaa	agacaaaagc	gattgcagca	aaaacaaaaa
30351	ttgactaatt	ttgtcaatta	aactaaaggg	atctaattaa	actaaacagc
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30451	ataggagaaa	atatttgcaa	actatgcatc	tgacaaaggt	ctattatccg
30501	gaatctgtaa	ggaatttaaa	caaatttata	agcaaaaaaa	caaacaacac
30551	cattaaaaaa	tgggcaaagt	ccttgaacag	acacttttaa	aagaagacat
30601	acacgtggcc	aagaagcata	taaaaaaatg	ctcaacatta	ctaatctttta
30651	gagaaatgca	aatcaaaacc	acaataagat	accatctcac	aaaagtcaga
30701	atggctatta	ctaaaaagtc	aaaaaataac	agatgctggc	aaggttatgg
30751	agaaaaagga	atgcttatat	actgctggtg	ggaatgtaaa	ttagttcagc
30801	cggtgtggaa	agccgtttgg	caatttctca	aagaactcaa	aatggaatta

FIGURE 1K

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30851  ccatttgacc cagtaatctc actattgggt ttattctcaa aggaatgtaa
30901  ctcattctac cttaaagaca tatgcactca tatattcatc acagtactat
30951  tcacaatagc aaagacatga aatcaaccta catgcccatt gatggtggat
31001  tggataaaga aaatgtggta catatacacc ataaatacta cacagccata
31051  aaaaagaaca agatcatgtc ttttgcaaca acatggatga ggctggaggc
31101  cattcaccta agcgaactga cacaggaaca gaaaaccaaa tacacatgtt
31151  ctcacttaca agtgagagct aagcattgag ttatatggtc acaaacaaga
31201  gaacaacaga cgcgtaagcc tacttgagga tggaaagtgg gaggagggag
31251  agcataaaaa aactacctat caggtactat gcttttacc tgcgtgatga
31301  aataatctga acatcaaacc cccataatat acaattcacc tatataacaa
31351  acctgcacat gtaccacaga acctgaaata aaagtttaaa aataaatcat
31401  aaaataaaat gttgaaatgc ctagaatgtt tcatagcatt aaattagacc
31451  atgctgtctt aaatgacatc ttattttcat agaaatcatg tttctgcttt
31501  ttctgttttt ctatgaaaat tttttaaca agcagaagtt aacgaaatgt
31551  atattttacc acttgggtca agaaacaaat gaaagtattg cccattaagg
31601  agcagttctt catactgtga taaatgaatg taagtattat gtttacatag
31651  atgaagtata aagagaccaa ttaatgtaaa aagccaatac tgtacaaatt
31701  cctgaaggac cattatttaa atctaacttt aatttttaga aagtccttat
31751  tcaagcaaac tttactgaga ccaatactaa ttatactttc ctgctaaaag
31801  atacagataa tgacattagt tagagcctta aagtactact ccaatggaat
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33601  cttagcttaa tgcctggtgt ttaatcaata ctccataact cttagtggta
33651  gcaaacagaa tcataaaagt gatgtgttca gtgaagcctc taatcaatcc
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33751  gtatgttttt gtttattatt tttcctcaaa atatcttcaa taaggcattc
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33851  gaggtaaatg gaaggagcaa gaaccaagac aggtactttt tgagtctgga
33901  gtccttagat ataataagta atttcaggaa tggtatgtat ggtacctaaa
33951  ggatgtggtt taattagaag ggcttttgaa gctttcttgt agactggttg
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34001  ttcattatgg  cttcatctat  gtttctccca  gaaggcttcc  ctggcctctt
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34101  atattcatca  ctcatgattg  tggttactcg  attcagcgtc  ttctatgcaa
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34351  acacacaaag  taaaaacaac  acagtcaaca  tgagcaaata  gagaaaaaaa
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FIGURE 1M

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46301  acttcaaaca  tttagattgt  gattcactgg  gtgcataatt  ttttaaattg
46351  tctcaaatca  acaatctttc  tcttactttt  ctaggttttc  tctaatgaac
46401  taactttata  gcatactttt  tgtgctgtag  tctaacaaac  cgatagctga
46451  gttttttaa   aaatgaatac  aatatatgct  ttttctgcct  cgcttttttc
46501  atctgtaaaa  tgggatctgt  gggataccta  acacataaag  tcattgtaag
46551  gattaaataa  ggtaatgttt  attaaaaaaa  aaaaaaacct  tagaactgaa
```

FIGURE 1P

```
46601  gaaaatgcca  agcacatagt  aagttttaag  tgtagtattt  tctgcacccc
46651  tactagccat  gtacttattt  ctagtatttc  caatatttta  gcatagtaaa
46701  tgaggtagta  tatctttttc  ttttctttct  acacttggga  gaaagcagga
46751  ttacaatgaa  ataaaagcaa  aatgtatgtc  caacagggtc  atataagtaa
46801  tgtctgtttg  taaaccacta  gtctcaggag  taaatccctc  aacatgatga
46851  aaaccaagag  atgtgtttgc  acataactct  ttttataaag  ttttttttaat
46901  tgcaaagaca  tagtcgttgt  tataaacttc  caacatacag  aaattaataa
46951  tttacaaagt  gaaaagccca  tttatgcata  tattcacttc  agctcactcc
47001  ctttagaaat  aattaatagt  aataatcagc  gtatagtctc  acttttttttt
47051  ttttttttgag  acgcagtctt  gctctgtcgc  taggctggag  tgcagtggca
47101  cgatcttggc  tcactgcaac  ctccgcctcc  tgggttcaag  ggattctcat
47151  gcctcagcct  tccaagtagc  tgggattaca  ggcacgtgcc  accacaccca
47201  gctaattttt  gtattttag  tagagacagg  gtttcaccat  gttggccagg
47251  atggtctcga  tctcctgacc  tcatgatccg  cccaccttgg  cctcccaaag
47301  tgctgggatt  acaggtgtga  gccactgcgc  ccagcctagt  ctcaaatttt
47351  tttcctagtc  atatactaat  atatatttct  attaaaataa  aatcacattg
47401  tacatactgt  tttgcaactg  gcctttattc  acttaaaata  tgtctttggt
47451  gtcagtgtca  acacatttag  ttccttcttg  tttccaacag  ctgccaagag
47501  tggtaactct  ctttggctct  ctgggtactt  acccacaaaa  gcacatgcat
47551  ttagagctgg  tggaaaaagt  ccttcagggc  ggacaccggt  ggctcacacc
47601  tgtaatctca  actctttggg  aggccaaggc  tggcagatga  tgtgagctca
47651  ggagttcgag  accagcctgg  gcaacatagc  aataccccat  ctctacaaaa
47701  aaatacaaaa  attagccagg  cgtgttggtg  catgcctgta  gtcctagctc
47751  cttgggaggc  tgaggtggga  cacagaggtt  gcagtgagca  gagctcatgc
47801  cagtgcactc  cagcctgggt  gatagagtga  gaccctgtca  aaggatggaa
47851  agagggaaga  aaggagagga  gaggggaaga  agccctttgg  ctgaaacttg
47901  cactgccaac  aactgacccc  ccctctctct  caaagcactg  acccaaaaag
47951  gggcaccagc  agagaggctc  agaagatctt  ctcagtccac  accaggagac
48001  cagacctttc  tcagtgcagg  gagaaggatg  agctgaatga  ggaatactca
48051  cttatacagc  agttaatcca  gaggatgaca  gaaacattac  aaatgtgaca
48101  tccttgaaat  ggaactcctc  tttggagtgt  ggaagcccag  tcatgcacaa
48151  cccacttgga  gcaggaagga  aattgtattt  gaggatgtta  aagtcaagct
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48251  cccacttcaa  agcctacttc  ccatcactca  gatgtttact  tatggagtga
48301  ttaagttttc  ttttatcttt  tctatgcttt  catcagatgc  tcttttttctc
48351  tttttttgctt  agaaaaggca  gatttttttca  gcctaatgtc  aatatgtcaa
48401  acattaagta  ttcattccct  tgcaatgcac  agtgtttata  cttacatacc
48451  ctattataac  aaatgtaata  ttatttaatt  atgcagcaaa  cttacacata
48501  attggtgaac  aggtctaaag  aatactctat  acaggaagca  tagagtattc
48551  agcttagctg  aggcctttgt  taaacaatat  gcaaagttgc  aggtgccaca
48601  ttagggaatt  ttgggggaaa  ggaaatgcaa  acttatttgg  caggaaaaca
48651  agagaaatga  ttatatctca  cagcactttc  aagctggaca  catttacatg
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48751  tccttttgcc  acaggaaaaa  ggatgaaacg  agagacattg  tgaaaggttg
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48901  agcgcagaat  ggccaaaggg  tcagaactac  agcaataggt  aggtcccatt
48951  ctctgccttt  tcattcttca  gtcttcggaa  atgccacaga  ggccaagtgg
49001  cactaggtgc  agctgggaat  caagatctgt  ttatctgtac  cttaaatagg
49051  tcaaagtgaa  ccttttggaa  atattgtttt  ggtaaataaa  aattcctggt
49101  cgtgctaact  gtggctattt  cgacctgttt  ctttcagATA  CCATTGTTCT
49151  TATCGCTTCA  ATAGCAGTTG  TTTCTGCAAA  AACTCAGGGT  AATATTTTTG
49201  CCACGTCTGC  ACTCAGAAGT  CTCCGTTTCC  TACAGATCCT  CCGCATGGTG
49251  CGCATGGACC  ACTCAGAAGT  CTCCGTTTCC  TACAGATCCT  CCGCATGGTG
49301  TGCTCACAGC  AAGgtaagat  ttgctctctg  aatttaaaaa  cacaattttt
49351  gaaactttttt  cattgatcgc  tgtaatagtt  aataaacctg  tcacaagaaa
49401  acttagtcat  tgcagaaaat  ggttaaaaca  attttgggac  atgatgtaca
49451  atggattatt  taagagccat  cataaacatc  caagaagtag  taaagtgaat
49501  agaatcctca  tagaattctt  ttttccttttt  tatctagGAA  TTAATCACAG  CTTGGTACAT
49551  aaaatctttc  attccttttta  tatctagGAA  TTAATCACAG  CTTGGTACAT
49601  AGGATTTTTG  GTTCTTATTT  TTTCGTCTTT  CCTTGTCTAT  CTGGTGGAAA
49651  AGGATGCCAA  TAAAGAGTTT  TCTACATATG  CAGATGCTCT  CTGGTGGGGC
49701  ACAgtaagta  taaaaataca  ttttttatttt  attggatgtt  gtgaattgtt
```

Exon 4(A)

Exon 5(B)

```
49751  tttttttaat  acaacgtaat  ggttcctatg  gatggtttca  ataaaaatat
49801  taaattgcga  aagagagtta  tatggaaaat  aaatactact  tattattgtc
49851  taaaggcttt  ccacatcttt  ttaggccaac  taagttgtct  tgtaaaccat
49901  cattaatatt  tcttgagtgc  tagattgttg  ccaaaattaa  aaatatataa
49951  aatatataaa  tatatatcat  ttttaaaatg  gtgattaaaa  cattgatagt
50001  ttgtttattt  gttttaactt  tgtggagcac  aaatttaaat  gatcaattgt
50051  tgcattgatt  ttccgctctt  caaaagttta  tctggggtta  aaaaatgaat
50101  ggaagctgtg  aataaaattg  cagcacaaag  aaatgaaaaa  gaagactggt
50151  aaccatctgt  gagatcagag  attatagtca  cctaatttca  aaactttcct
50201  ctcaaaacct  acttttrctt  tatattatta  aagaataatt  ttccaaataa
50251  ataaagtaaa  atcatgattc  ttacatagaa  agaaaattaa  cacatgctaa
50301  acattcattt  aactcatttt  aaaagtttaa  gtcattatta  atgaagaaac
50351  cagtaagatg  ttaaaaccag  ttcaaagcac  tatccaaagg  acagaaacat
50401  ttaaagatca  ggaatattga  aatcaatgtg  caaatagagg  caaaactggc
50451  tccttccaca  gtgtgggagg  gaagtcagtt  caacctccac  taggcagaat
50501  ttatttacat  gtccataggc  aagaattatt  ttgcattgct  accagttatc
50551  aacaacttac  agagttgtaa  aatagctcaa  aggctatgaa  aagagcagag
50601  ccccataaaa  tcagaatcca  aaaacctgga  agggtgtact  ctgaacaacg
50651  catagttttc  cactgaagca  aaaattttcc  ctgcattgta  aagaatttat
50701  gaaacagtca  ttggagctat  gccgtaataa  gaatgacatg  ggatatagga
50751  gtgctttatg  caatgtataa  attacatttc  tttttatttt  attcctttaa
50801  ggtattccaa  aggggagtta  tatgaaaata  atcatagcca  aacatggtgg
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50901  tgagctcagg  catttgagac  cagcctgggc  aacatggcaa  gaccccatcc
50951  ctacaaaaaa  tacaaaaatt  agccaggtgt  ggtggcacac  tcctgtagtt
51001  ccagctacct  gggaggctga  ggtggcagaa  tcacttaagc  ctggcaggta
51051  gattataaat  gcttgtctaa  agaatgtcca  tatcgttttg  gttcaaaaaa
51101  ccccgtgagt  tctctttttaa  accacccttta  gtatttcttg  agttctagat
51151  tgttgccaaa  ataaaaatat  atcattttct  taagctgtga  tttaaacaat
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51251  gcattgttcc  actagtcatc  aaaagctcat  cagcaagacc  cagaacattt
51301  gtcagagagg  gggaaaattt  gttagggctg  tatttagcag  aacttgttgt
51351  atttgttgat  tgcatagcag  caataaaatg  aataaaaatg  agaaatacat
51401  tcacctaaag  attcgaattt  ttttcttaag  ttatctaagt  aaatgtctac
51451  aagattatgc  cattggtttc  aaaggattcc  gttggtttaa  taatgtggtt
51501  tccggctgct  cttcactatt  cacaagcaat  aatgggcatt  tcgaaaaaga
51551  gtggaagctt  gaaagagagc  agttatctga  cattcttaaa  atactttta
51601  tatgtagaga  gcaaatgaaa  atctgtgact  catgatggga  taaactgtaa
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51701  atcccagcct  tcaaagcaat  ggtttgaatt  caagtttaat  ttttgcttct
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52151  gagagtaaaa  attttataag  agatcaaact  tcgaagaatt  ttttaaggcc
52201  ttattggtcc  gtagcaggtt  tgttgatatt  aactgactca  ttaatgaaat
52251  tgtctgaatc  ctaaaaagac  agaagaagca  aacaaacaag  agagctcatt
52301  gtttctattc  attttaagaa  gaacatatac  tagattccta  gtgggaaata
52351  aaataaattt  agactattat  accttttatt  tatacattaa  tcaagacctt
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52451  ctaatggaaa  ccttaataac  tatggaagta  tccagaataa  ataggaaat
52501  gatagcatcc  taaatgagag  tatttctaag  tgttacactt  tgatgaaaaa
52551  aggaaatccc  ctatattaaa  agatcccaca  gtatcaacat  taagtatcaa
52601  aatataggtt  ttgttccaca  gatacgctgt  gccagtgaat  tttcaatact
52651  aactctggaa  ctccttccat  taagatagtg  agatctgtcc  cctagatcaa
52701  catttggagg  gatatcatgg  tgggatcagt  gctgcccaaa  aaactttgat
52751  ccctgaaagc  agtttcatat  tagtgaatag  caataccatag  ttcattgagt
52801  aagtgaaata  gatataaaag  acctggtacc  aagaacatag  gaagtgccca
52851  atcaaatatg  agagctattg  ttggtgtaga  catcattgct  gtggaagtta
```

FIGURE 1R

```
52901  aatgaaagca  cctttaatac  aaaaggaaca  aaaaaagagt  tatgtgtttt
52951  gatgcagacc  cacagtttga  acacagaaga  ggcttgggaa  ttggaggttg
53001  tgatgaaaag  atgtcctggg  ttctgatgtg  gcaactaaag  ttgcattgat
53051  ggcagaaaat  ggaagaggga  agtagctcta  gtagctgagg  cactgagagc
53101  tgctggaaaa  ggggatcttc  tgattgttgg  atagagctcc  atttattatc
53151  attttctatt  gttatttttc  tcatttttgg  ttgttccaga  tttattctga
53201  aataatttaa  gaatgggttt  ccctggagtt  attttctgtt  attaaatcct
53251  tcctgttttg  tgggagtgat  tttttctcttt  ttgatctgct  ttagatttat
53301  tttgaaataa  cttaagatca  ggttttcctg  cactccagcc  tgggtgcttg
53351  agtgagaccc  tgcctcaaag  actcccttgg  ggagaattat  accgtgccac
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53451  aatgtacata  gatttactaa  aaacataatt  gtatcttcaa  aatcaggtca
53501  ataaatattt  gttgatttgt  tgcctgaaag  aaagaaggat  ttatatctcc
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53751  ccacctcaga  ttttcctaac  ataattacaa  ctttatgcca  acatttccaa
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54151  tttgtcactt  gtaatttgtt  tttaatttta  aaaagtaaat  tcaaaacgtc
54201  atgaccttac  ctatgatatt  ataaagatca  tactcaaaag  tcacgagtat
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54301  caccagcata  tctcttacaa  gctctggaat  gaggaaaaaa  aatggaatta
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54601  tactgaggct  tgcagagcac  aaaatgctct  ttagtatcca  cagaattctg
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56001  actggcagag  aattacacaa  caaagggggc  gggatgtgat  ggaagtatct
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56151  gtgtaaaggg  agtgtgttat  ttatttgttt  ttctttataa  cagtaatcca
56201  ttttttccaa  aatcagctct  ggctctttaa  cttcatttgg  cccatattac
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56451  cctcatcacc  caattcaatt  gtgaagtcta  gatgtgattt  cctccaagcc
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56551  ttccagaatc  tccccactta  ttctgaagaa  cgggtgccct  tgggttcttg
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56701  ggtttattat  ttagcacaag  catgggagaa  taagaaccaa  gagggctcct
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57201  gacaaaactg  ccaccctgtt  gccagatcct  tcccaagcct  aagctgccaa
57251  caaaaggccc  ctttgcttta  accaggaaac  atccctagct  catttgaaat
57301  cagaggggag  aaagttattg  aggctggggg  ttcagttgct  ggctgttcag
57351  gtcccttgca  ttcagtgaaa  tgtgatcatc  ccggaagcct  gaactggagt
57401  gtagggagaa  agtgggcagg  gtctttgctc  accccagag   gaactccaga
57451  gtgctgttct  cagatttcac  aaccttctat  tctcccccgc  aaaccacccc
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57551  cttttctact  caggatgaaa  cactgagcac  attgtcactt  ggctgtgtcc
57601  cattcttcag  agttagagtc  agtggtttaa  aacccactct  gtgagcactg
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57751  tattaataaa  ccgatgtaaa  aggattaagc  tatttttcag  aaaaagtata
57801  gtagattaat  atctgtccca  catatataaa  gattaagaat  aaaattgacc
57851  tggaaatttt  ttttctgcat  tctcaaggaa  ttcttttgag  aattccatat
57901  taatactgct  gatgacatta  gattaatttg  gctcctgtaa  agttctacta
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FIGURE 1U

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70751  agatgaactt atcaaaaata actacaacaa cttttcaaga tatacacagc
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70901  aatcggagtt aaattgtgat cagtttaaaa taatgggtta taaggtatta
70951  tttgcaagcc tcatagtaac ctaaaaatca aaaaagcata caatggatac
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71301  catagattga aaataaaggg ataaaaaag atatcccatg caaatggaaa
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74851  tgtttattgc  agcactatac  acaatggcca  agatttggaa  gtaacccaag
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75101  aaggattaag aaaatgtggc acatatacac catggaatac tatgcagcca
75151  caaaacagga tgagttcatg tcctttgtag ggacatggat gaagctggaa
75201  accatcattc tcagcaaact atcgcaagga cagaaaatca aacaccacat
75251  gttctcactc ataggtggga attgaacaat gagaacactt ggacacagga
75301  tggggaacat cacatactgg ggcctgtcat ggggtggggg agaggggagg
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75401  cacaccaaca tggcacatgt atacatatat aacaaacctg cacattgtgc
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75501  aactcacaaa gatagagagt agaatgacgg gtaccagagt atgagaaggg
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75701  tataattgga ttatttgtaa cacaaaggat aaatgcttga ggtgatggat
75751  acctctttta ccctgatatc atcattacat atcgcatgca agtatcaaaa
75801  tatcccacat aactcataaa tatatataac tactgtgtac ccacaaaaat
75851  taaaaattat taataaaatta ttagtttgat ttaaaaaaaa caaggatgct
75901  cacttttgcc acttctattc aatatagtag tggaagtcca tgccagagca
75951  gttagacaag agaaagaaat aaaaggcatc caaataagaa aggagaaag
76001  gaattttttg ctgtttgctg acaacataat cttatatata gaaaaccta
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77151  GGAAGATTGC TTTCTGCAGG CTTTGCACTC CTTGGCATTT CTTTCTTTGC
77201  ACTTCCTGCC gtgagtatct ttgcaccaat aaagcagttt aaattagatc
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78001  gagacccccag agcacctctc caaagctctt ttaggtggta gggcttctcc
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Exon 6(E)

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82551   cttttagtag  gtgtacagtt  ataacattat  aaagaactac  agctgggaca
82601   gattttatac  agtcctctct  cctccatttc  atgaatagag  aatctaactt
82651   tcagagtctc  atcaaagtgc  tagaagtatt  cccatgttca  cagcagtgag
82701   actttaactc  cctcagattt  aaaatccagc  tctgtcccaa  gttgaaattc
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83001   atactgctta  ttttaataag  taacatgttt  atggacaggt  tacataccgt
83051   ttgtcttctc  tcagactcat  tttagtgact  ttttaatatt  tgtattattt
83101   aacagtgctt  ttgaaatttt  tgagtgccat  ttttgtattt  tgttccagGG
83151   CATTCTTGGC  TCAGGTTTTG  CATTAAAAGT  ACAAGAACAA  CACCGCCAGA  ┐ Exon 7(C)
83201   AACACTTTGA  GAAAAGAAGG  AACCCAGCTG  CCAACCTCAT  TCAGgtaaat  ┘
83251   gtcaatgtaa  taggtagatg  gcaacatttg  tgtccatagt  gcttgatggg
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85201  tcttggaata tcagctgttt tgttagaaag tgagctcttt gaggaatttc
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87401  gaataaggat gacataggat ttctcattag taatccaaaa attagaagac
87451  aatgaaacaa tactttcgaa attatagaaa ttattttcaa cctagaacgc
87501  tatatccagc caaaccacca tcaagtgtga gagcagcacc aaggcacttt
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87701  aaggggattt ctatgataat agggaaggga agtcccaaga caacagctat
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Exon 8

FIGURE 1AE

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95201  ttatcattaa aaaacaccag ccccatgctc ttgttcccca gttttaaaga
95251  catagtggga tgctttgatt ccactaaaca ggatgaaaga gaggtctaag
95301  aaacagctgt gcagggcaga gagaaatggg aggagggaca ctcaaacctg
95351  ccagggatac aaccagcagt tccttactct ctcttttcag gtctggtttg
95401  tctcttacat acactctaga ggtcttagca attctatttc aaagtttat
95451  tttaataaca gaaggatgta tagaagcaag tacttttctt gattttctcc
95501  tcaaagagag tgaagctgca aagggcaaaa cacaggtaaa tatgctattt
95551  agggaatgag tcagaaattt tatgaggcta tggggaatta tcaagctcca
95601  aaaacacctt gtggtacctt aagaagtggg gatttggaga ttatctaacc
95651  taaagccttt gatttactca taagaaaacc aaaacctgca agcaaataag
95701  gtgcctgccc aaaggcacac agctcgtttg caaagagtac agaccctaca
95751  ccatggtgct tagacctaca tttgctaaaa tgagttatta caaatgccac
95801  ccaacagtat aggctaaaag agttttggta aatattctat gtaccttatt
95851  tactccaagg aaatttagat tttatacgat acaaaaaaaa atctgcctca
95901  gcaagtgact gagatacaat tcattaatga atccaggttt agaaaccaaa
95951  gtctgccaga tgcacagaga acagttatgt tgtaactagc aacattctaa
96001  gagcccttgc taattctggt tagatcagaa ccactttttc ttagccatgg
96051  atagctttgg ctaatgaaaa gtctattgtt ttttattcta tgtgggcagt
96101  cttggctttg ccaagtaaat gttgtgctat ctctggtctg tatcacaaag
96151  aatatatgtt agcaagttga gtacatttat tataaagaac actgcttttg
96201  tggatcttgc atgaaaagag ttacttaagg tatttgattc cccaatctcc
96251  aatttggcca ttatcaagtg ctataaatat attcactggt ttatcatcat
96301  ttctcttctg cctgcacgca cctgaagGAA AGAACAAGGG GAAGCATCAA │ Exon 9 │
96351  GCAGgtttgt gatttctctc ttgctacatg tttgtttata aatctgatac
96401  ctaccaggtg tttaaaatgt gtctcatgtg agtaaaatcg atcaacaaat
96451  acaagatgat taaaagtgac ctttcacaag attgcctgca aagattgcta
96501  ttttattgat atttcgcccc ttagtatcaa agtgtctttc cctaactcac
96551  tccctgcttt ttcaaaatct gcagggcatg gaacatttgg aggtggggga
96601  ggaggggaac tgatcttgga ttagtccttg ctgttgtttt cccagacaga
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96701  attttttttc tgaatgtaaa aagtccaggc agcagtcctag gatacactcc
96751  ccttcactag ggtccttctt ttggagtgat atatatatat atatatatat
96801  atatatatat atatatatat atatatatat atacacacat atatatatca
96851  tatacatata cacatacata cattatatgt atatgtatat atacctatac
96901  atataatctt tttttttttgg caagatgaaa ccacctctct gtgacatctc
96951  cagatctcca gcccactgag tgctgaggtc tactcaagtg actcaaagag
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97051   ataatttatt   atcagcttcc   catgacttag   atggaatgcg   tcgtcagatt
97101   acagcagaga   attaaaccta   gagggaatac   gaggtgaaag   aaaaatttct
97151   tgatctgtgt   taatgagtac   caggaagtgc   ctagatttga   gagcaaagcc
97201   ctgaaaaaca   gagccaggtg   gaacccagta   ttaatgatgt   gaagagtggc
97251   agaggcagaa   ccagcaagga   gaatcccagg   tgcctggaaa   ggaagaagag
97301   atacattttt   tttcctatca   ttgtcactgt   gtttccataa   agaaatgaag
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97451   tatatttatg   caatactgaa   gccagttttg   aaagttcact   tggtgtatta
97501   aggctctgga   ttatccattt   ttgcattatg   tttatatgta   aagataaaca
97551   aatgaaaaca   taaatgcatt   cgtctatgat   gggagatagg   cacgatagga
97601   tatacaacat   caggcacatc   ttctgcgtag   gtaacctacc   caagggatgg
97651   cattaaagtt   ctttctctta   tttggtagca   tagagttaga   gccaagggca
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97751   aagaaacgtt   tttgaccaaa   gagaggttct   agtcattaga   ttcggaatag
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98501   agagaatcac   acatggaaat   ttcttgcttc   tctgtggtca   ttgaacattt
98551   ggcaaaaacc   accttgaaat   aagtcctgca   ctattactta   gcctagattc
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98651   agctgtcaca   tcaccctggg   taaagctatt   acagaatgtg   ctcaataaat
98701   aattcttgga   tagagtaata   aaatggccct   gacctcaagt   agtttgtggg
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98951   agcaacagta   ccatcttaga   aagtaacaaa   gttgtcctta   cccaagcaaa
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99751   acaaaaatta   gttgggcgtg   gtgctgcatg   cctgtagtcc   cagctacctg
99801   ggaagctgag   gcaggagaat   cacttgaacc   tgggaagcag   aggttgcagt
99851   gagctgagat   cacaccactg   cactccagcc   tggacgacag   agcaagactc
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100301  cagaataagc  caatattctc  accttgaggt  tttatgtggt  tctcccttcc
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102101  ggattactgt  ggggttatga  tgatgccaca  cagttgcctg  gcagagaaca
102151  gccggtagta  gactgcatgc  taggccattt  gaataacctg  tacatctggt
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103151  tgtatttagt  tgacatagaa  aagagatata  tcttgaaagt  tggagaaaat
103201  aatttgatat  taactaaaac  caaccttttta tagtaattag  catctgttag
103251  ttccagaaaa  ggtaatagat  aaaatcaaat  atagtgagga  ccaattgtaa
```

FIGURE 1AH

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103351  agtgagcata tgcttcctga actagatcat tgtaaattta aattatggaa
103401  cagatgtgtt gaaactaaaa agagatttga aactttaca atttaaaaaa
103451  aaaaaagctt gagaaaagta gatattttg ggcaccatcc ctttgacaga
103501  tttgtttaaa taattgaagg ctttgggatg acatggaaaa cctagcctga
103551  gaattaaaag atgcaggttt atgatgttat tgttgctctt gtttaatgta
103601  atctatcatt taatcacaca tgtgtcaagc acagataaac tcttccactg
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103751  ctgtgtctgc atttcagagg ggagctgtca gttgcatggt caacttgttt
103801  attgtttcca gaactccctg accaccagtt catgatttga tttgttttca
103851  tgtaaacaca cataaacgt ggtgcccttt tagaatatcg tttgttaagc
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103951  catatccact aaacacattt gctgttggca tgctgcagtt ggggacagtg
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104201  tcaccttcta atgaatggca taatttcact ataaaggaaa caagaaaaaa
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104351  ctagcccccg tgtgtctaat cccaacctgc ccttcctagc acatcatagc
104401  atatctcttg attaggaaag tgtgaagatg cactttggat tttatgattg
104451  ttgttaatgc ttctttttatc agcccacaac aatttgatct tagccggcat
104501  cagagaacg aatgcctgaa caaatataat ttaccagtag ctgccacagc
104551  aaatcaataa cctgttact agcaggaaat tgtgttagtg aacataacat
104601  ctcattctct tcatcagtca tcacattcat tatctgttgg ggctgttcta
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105201  tacttaccca agcaaagtgg aagaaattga ttgaaatgga ataatcatgc
105251  ctctgttctc cacagTCAGA AGCTAAGTTT TAAGGAGCGA GTGCGCATGG
105301  CTAGCCCCAG GGGCCAGAGT ATTAAGAGCC GACAAGCCTC AGTAGGTGAC
105351  AGGAGGTCCC CAAGCACCGA CATCACAGCC GAGGGCAGTC CCACCAAAGT
105401  GCAGAAGAGC TGGAGCTTCA ACGACCGAAC CCGCTTCCGG CCCTCGCTGC
105451  GCCTCAAAAG TTCTCAGCCA AAACCAGTGA TAGATGgtaa gccctgtttt
105501  tccataacca tttttaattg gataggctat agtgagtgag attatgaagt
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106351  taacaaccag gggtcataat cacaatgatc tgaggatccc tgcagtgaag
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<div style="border: 1px solid black; display: inline-block; padding: 2px 8px;">Exon 10</div>

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107201  caatgaacag gta- gctct tgtaataaga aggcaataaa ggattttctt
107251  ttttaaaaaa aaaaagccc tcagtttaga aaaacaaaat gttaggggga
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FIGURE 1AM

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119151  ctgatttctg  cattaatttt  gactaattga  aatcctggac  ttgcttaatt
119201  tgcatgtatt  tgtcttccct  tcttccagta  cttgatggca  atttctacct
119251  gtggtaaatg  gaacgttaaa  agttatatgc  ttatacaaac  tttagtcctt
119301  tattccttgg  agtgagtttt  aagagtcctc  atgttgaata  attcatgtaa
119351  tcacagaaat  aatactatgt  atcagggacc  gcttccttta  ttaaagataa
119401  aggcagtgga  aatactgcct  ttgtcagaaa  tacttcagtt  actctgagag
119451  agagagacat  ttgtttacta  tatgacagca  cagtgcatgg  caaataatag
119501  aagtttggaa  aatatttatt  ttgaatgaat  gaataatgaa  cacattgtga
119551  acaaataaat  ggtttactat  ttaattattc  aggaatcaat  taagctttat
119601  taataaaaat  tgtttggggg  ttttaaaaag  cccacacaca  aatgagaggc
119651  atcacagagg  caaacggtat  gacattatta  aaatcgttat  tgctgaatca
119701  cagttcagca  ataagcaagt  gtttgaggca  ttcaaataag  tgagtatttg
119751  agtgactcta  agaagataat  gaaactcctc  cactgtttta  cagttgcaat
119801  aatttttaag  gaacatataa  aaacatattc  tagtgtttcc  atttgaataa
119851  agatagtata  tataacatat  gcaattaaaa  agaagaaaga  aaacaaattt
119901  taatgtgttt  ttctttttcac  cttatgggca  gttactagat  gtatnnnnnn
119951  nnnnagcttc  atcttgcccg  tagaaaacag  ttcagaaaag  tattcatatt
120001  taaaactggg  gaggctgtag  aaaaagaaga  aagaataata  ttggcaagac
120051  aattggctga  ccttatacat  atcttggttt  atcagcttac  tctgtgagta
120101  tcccgccatt  tccacgtgag  aaaaattcag  caacatgttt  caaattgcgg
120151  atggtggtgt  tatttaactg  gcaatattct  cttgcagCTG ACACAGCCCT
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120201  TGGCACTGAT  GATGTATATG  ATGAAAAAGG  ATGCCAGTGT  GATGTATCAG
120251  TGGAAGACCT  CACCCCACCA  CTTAAAACTG  TCATTCGAGC  TATCAGgttg
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| Exon 11 |

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120301  gtgaaaatct  tgaacaacgt  gattcagaga  catacttatg  attaattgaa
120351  ttactatgtt  gctaagttct  ttttctgcag  gtaaatatcc  tggaataacc
120401  acttttcctt  tcctattcat  nnnnnnnnnn  aatagagtgt  tttgcaaaca
120451  catttgtatc  tcaaaaatgc  atgtagttcc  ataaaagacc  attttaacag
120501  cctttatatt  ttttaaggga  tgctattact  agatgttgta  tcttggactt
120551  ctggagattg  catggaaaag  ttagaattgc  attttgactt  taacttacat
120601  tcagggtttc  aacggacatt  aaaaaggcaa  aacacttagt  gttcagcctc
120651  ttttttagtg  tgttttttcta  ttcttaaggt  gttgtctcac  atgagatgtt
120701  cttaaattgt  ccactgtaat  ctcaggcttt  tatattacac  atctgcagaa
120751  gccaaaaata  atttgatgca  tgactttttcc  ccccagagtt  tcttattata
120801  tttactggta  aactattttg  gtaacttata  ttaacagagt  tataaagatt
120851  aaatatgtaat  atgttctcat  acagAATTAT  GAAATTTCAT  GTTGCAAAAC
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120901  GGAAGTTTAA  GGAAACATTA  CGTCCATATG  ATGTAAAAGA  TGTCATTGAA
120951  CAATATTCTG  CTGGTCATCT  GGACATGTTG  TGTAGAATTA  AAAGCCTTCA
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| Exon 12 |

```
121001  AACACGgtaa  gcaatggaaa  tgtcattcct  tgtaaaggaa  tgggcatagaa
121051  acctatctag  gaagaacttc  tctttagtag  agtaaacctc  tgaactccat
121101  attttttcatt  catttttagt  gggcaaatgg  aatttgcttt  aaacattgat
121151  tttatttgc  ttttaacata  gatataactc  aggcattcaa  agcatccaac
121201  tgtctcattt  tccttatctg  taaaaatggg  aagaaagtta  gttcttgcct
121251  tatagggttg  tcatgaggat  tgaacaagtt  aatgcatgta  attcataaca
121301  tgtaacaggc  ctggtactgt  gtctaataaa  catcaatggt  tgttgctgat
121351  gtttgaatta  ttactgctgc  tgatcctaaa  ttatctaaat  tccatttatt
121401  atctaaattc  taatcatcct  ttgggaataa  cgtactattt  ctccttcatt
121451  aagtttcatc  caaccatcca  acctgtgaag  acgggccttt  ctctgacctt
121501  tatacagtag  cagagtctac  tgcagagcac  aagagcactc  agaatctcgg
121551  tgtgctgggc  caaagttgag  acttggccct  tgtgttgttt  cctggttgca
121601  agtgtgttca  ccttgctctg  gactaagact  gaggtccttc  attcatgtcc
121651  tgtacggttc  tacaaatata  ctatcctcct  agtagcatct  tattgagtga
121701  ttaaaagaaa  tgaattccac  atgttaattc  caaccacata  tggttgattg
121751  tgattatctc  aaagccaaaa  tattcagtaa  attcagtttt  ttaagagcct
121801  tgctttatta  ccagcacaaa  ttaccagcat  ttgtgattgt  atagtgccca
121851  aaatgcaagg  actgagactt  gacttttttt  tatgcccccc  agcacactta
121901  gcccagtgtg  aggcatataa  tgggccctta  gtaaaatacc  tgttcatcaa
121951  ttgttataga  aataacaatt  tgttaattca  tttagcaggt  aattattgag
122001  cccatcatgt  gtgccaggac  ctgtggacat  ccagagattg  ataaaataat
122051  gacccagacc  ttgtagagtt  tgcagtttag  taaattagat  gnnnnnnnnn
122101  ngaacatctg  aacatgacca  gagattgtgg  tcatattgca  atctctgcct
122151  agatggccat  ggccttctaa  gttctttaat  aaaactgtct  acagctccca
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122201   aggttttata aagttgaact gctacagaat ttatagaacc aatcttgggt
122251   ttctagctca tgtatcttct ccaacttgaa ctccgaaaga aaaagaccat
122301   ggctttctta tctgcttatc tttcacacat gtacaataga tgctcataga
122351   ataatctgtt ctattaatgt aagatctcta tagttatgat ttttgtcata
122401   ttttgaaatg gttaaattca ggaactgcct gatcagaggt agaaacatat
122451   tactttgtag tttaggacac ttttacttcc agaagatcac ccataagtga
122501   tttcatcttg gaccagaata atgagaaaat taatttcatg tgtaatctca
122551   tgttcaaata agcatatcaa ctggaacaag ttctttctta tttcatctta
122601   cataaattga agataactgt atttaatttt tttttccaaa actcttcatt
122651   ctgacctagg gcaatctcca ccttcagccc tcataatcag atctcctctt
122701   tctctgatag TGTTGATCAA ATTCTTGGAA AAGGGCAAAT CACATCAGAT
122751   AAGAAGAGCC GAGAGAAAAT AACAGCAGAA CATGAGACCA CAGACGATCT    Exon 13
122801   CAGTATGCTC GGTCGGGTGG TCAAGGTTGA AAAACAGgta caactcaact
122851   acgctgggta tcttttttagc cagaattttt ttaatcaaaa tttattatag
122901   gcaattgtat gtattccagt gattatttta aaataaataa aatcacaaaa
122951   agagtgaata aaattaaatt ttctttgtgt gtagacagtg ctctctgaaa
123001   cactctggat ttccctttaa ggaatagaaa atctcatctc atcaattaat
123051   agttaattgg aaacaactat agatttccaa tagttgaaaa tcgtttaaaa
123101   ataacaaaga tctattcttc atttgtgttt cagttgtttt tattgtttct
123151   ttttttaggtc attaatttt ttttttttt tttnnnnnnn nnngggacta
123201   tgggcatgca ccaccacacc tggctgattt ttgtattatt tttggtagag
123251   acgaggtctc accatgttgc ccaggctggt ctcaaactcc tgggctcaat
123301   tctcctgcct cagtttccca aagtgctggc attacaggca tgagccactg
123351   cacccagcct ggaatggaaa gtcttaaagt tgcattttta tagtgcttat
123401   atgacttta agaggcacta tttaaagaag tggtggggga gagatgctaa
123451   taaagactgt atagaagcca aagtgtccct ctcttcctaa gtcctcctct
123501   ggccccatca ttgctaaatg ttacattcac taagggtcaa gactgcatcg
123551   tactttatat tcaatatttc tttaaatgtg ttggcacacc ttgacttcat
123601   ttttcaaaat taaaaatga agtccattct taataacaga ttatactcat
123651   gtgtaaccat tttccttcact tctagGTACA GTCCATAGAA TCCAAGCTGG
123701   ACTGCCTACT AGACATCTAT CAACAGGTCC TTCGGAAAGG CTCTGCCTCA
123751   GCCCTCGCTT TGGCTTCATT CCAGATCCCA CCTTTTGAAT GTGAACAGAC
123801   ATCTGACTAT CAAAGCCCTG TGGATAGCAA AGATCTTTCG GGTTCCGCAC
123851   AAAACAGTGG CTGCTTATCC AGATCAACTA GTGCCAACAT CTCGAGAGGC
123901   CTGCAGTTCA TTCTGACGCC AAATGAGTTC AGTGCCCAGA CTTTCTACGC    Exon 14
123951   GCTTAGCCCT ACTATGCACA GTCAAGCAAC ACAGGTGCCA ATTAGTCAAA
124001   GCGATGGCTC AGCAGTGGCA GCCACCAACA CCATTGCAAA CCAAATAAAT
124051   ACGGCACCCA AGCCAGCAGC CCCAACAACT TTACAGATCC CACCTCCTCT
124101   CCCAGCCATC AAGCATCTGC CCAGGCCAGA AACTCTGCAC CCTAACCCTG
124151   CAGGCTTACA GGAAAGCATT TCTGACGTCA CCACCTGCCT TGTTGCCTCC
124201   AAGGAAAATG TTCAGGTTGC ACAGTCAAAT CTCACCAAGG ACCGTTCTAT
124251   GAGGAAAAGC TTTGACATGG GAGGAGAAAC TCTGTTGTCT GTCTGTCCCA
124301   TGGTGCCGAA GGACTTGGGC AAATCTTTGT CTGTGCAAAA CCTGATCAGG
124351   TCGACCGAGG AACTGAATAT ACAACTTTCA GGGAGTGAGT CAAGTGGCTC
124401   CAGAGGCAGC CAAGATTTTT ACCCCAAATG GAGGGAATCC AAATTGTTTA
124451   TAACTGATGA AGAGGTGGGT CCCGAAGAGA CAGAGACAGA CACTTTTGAT
124501   GCCGCACCGC AGCCTGCCAG GGAAGCTGCC TTTGCATCGA ACTCTCTAAG
124551   GACTGGAAGG TCACGATCAT CTCAGAGCAT TTGTAAGGCA GGAGAAAGTA
124601   CAGATGCCCT CAGCTTGCCT CATGTCAAAC TGAAATAAGT TCTTCATTTT
124651   CTTTCCAGGC ATAGCAGTTC TTTAGCCATA CATATCATTG CATGAACTAT
124701   TTCGAAAGCC CTTCTAAAAA GTTGAAATTG CAAGAATCGG GAAGAACATG
124751   AAAGGCAGTT TATAAGCCCG TTACCTTTTA ATTGCATGAA AATGCATGTT
124801   TAGGGATGGC TAAAATTCCA AGGTGCATCG ACATTAACCC ACTCATTTAG
124851   TAATGTACCT TGAGTTAAAA AGCCTGAGAA ACCAAACACA GCTAATGCTA
124901   TGGGGTGTAT GAATATGTCA AGTTTAGGTC ATTTAGAAGA TTTGACACTG
124951   TATTTTGAAA TTATGGGAGT AAACACCTTC AAATTTCAGG CATTTCTGCT
125001   TTGTGACTAA ATACAAACTA CATTTTCAAG ATTAGGCCAT AATGTATATT
125051   TAAACACAAT GGCTATCAAC AGCTGCTAAT AAGGTATCAA CTAAAGCAGA
125101   ATTGGGGAAT AATAGAAATG GCTGCTTATT TCAAGATATA TTTGCCAACC
125151   CATTCCTATT CAGTCATTTT ATTATTAATG TAATTTGAAT GTCAATTTGT
125201   GTGCTTTTGG TGATTTAGCG CTGTGGCAAG CAATTTTGCA CATCATTTTC
125251   ATGTTGTTCT TTATGACAAG AATGTTCTTC AATTAGAAAA TGTGCAAATA
125301   ATGAAATTCA GGGCCAGTGA GGCAAATAGA CTATCTGACA TATTTGACTT
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125351   TATGAAAACA TATTGCCTGA TGGCAGAATC AACTTTATAA GTGGTCAACT
125401   TCTACACAAG CGTATGAAAT ACTGGTCAGT AGAACAGCCA TTGTGATTGG
125451   ACTGGTTTCT CTGCAATGGC GCCAACCCCA GGCTTGCCAA TACTGCCTAT
125501   GTAAAGGGCA AGTGTGAGAA GCTATTCTCA TTTCGCTGAC ATACAGGTAG
125551   GACTATGGGG GATGGGACAT TTGAGTGGGA CTGAGATAGG AAAGGCTTGA
125601   AAAGAACCCA GAAACACCAC CAGGAAGTTG GCAAAGTAAA AGAAAATGAC
125651   TTCCCCCTCA AAGGGCAATG AGAGGGAGAG AAACAAACCA AAATAGAAGA
125701   ACTAGACTTT TTAGAAAATG AGTATTGCTA GGGAATTCAA CTACCTAATC
125751   TTCCCTTATT CTTATATATA AGCAGAGAAT TTTTGCAAGG TATTTATTTT
125801   TTAATATGCC CTGAATGTCT TTTGCTATTA TGTGTACATT TTGCATATGA
125851   AAGTCTAAAA CGAAACTTCC TTTACTTTTT ATACTGTAGT GAAAATTTTC
125901   TATTCTTCCC AAGAATGTTG TCCCAAATCT GAAATTACTG GTTCAATTTC
125951   CTGATATAAA
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FIGURE 2A

KCN6q cDNA

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  1   CTGGAGTGAGGCGCGGGAAGATGCCTGGTCCTTGCCTCGCGGACTTGGCA      50

 51   GCCGCGTCCTGCGGGTCTGTCCACTGAACTGCTGAGGACTGCGGCGGTGG     100

101   CCTGAGGGAGAGCCGCCGGGGCAAGCAGGGGGCCCGGATGAGCCTGCTGG     150
  1                                            M   S   L   L   G      5

151   GGAAGCCGCTCTCTTACACGAGTAGCCAGAGCTGCCGGCGCAACGTCAAG     200
  6     K   P   L   S   Y   T   S   S   Q   S   C   R   R   N   V   K     21

201   TACCGGCGGGTGCAGAACTACCTGTACAACGTGCTGGAGAGACCCGCGG     250
 22     Y   R   R   V   Q   N   Y   L   Y   N   V   L   E   R   P   R   G     38

251   CTGGGCGTTCATCTACCACGCTTTCGTTTTTCTCCTTGTCTTTGGTTGCT     300
 39     W   A   F   I   Y   H   A   F   V   F   L   L   V   F   G   C   L     55

301   TGATTTTGTCAGTGTTTTCTACCATCCCTGAGCACACAAAATTGGCCTCA     350
 56     I   L   S   V   F   S   T   I   P   E   H   T   K   L   A   S     71

351   AGTTGCCTCTTGATCCTGGAGTTCGTGATGATTGTCGTCTTTGGTTTGGA     400
 72     S   C   L   L   I   L   E   F   V   M   I   V   V   F   G   L   E     88

401   GTTCATCATTCGAATCTGGTCTGCGGGGTTGCTGTTGTCGATATAGAGGAT     450
 89     F   I   I   R   I   W   S   A   G   C   C   C   R   Y   R   G   W    105

451   GGCAAGGAAGACTGAGGTTTGCTCGAAAGCCCTTCTGTGTTATAGATACC     500
106      Q   G   R   L   R   F   A   R   K   P   F   C   V   I   D   T    121

501   ATTGTTCTTATCGCTTCAATAGCAGTTGTTTCTGCAAAAACTCAGGGTAA     550
122      I   V   L   I   A   S   I   A   V   V   S   A   K   T   Q   G   N    138

551   TATTTTTGCCACGTCTGCACTCAGAAGTCTCCGTTTCCTACAGATCCTCC     600
139      I   F   A   T   S   A   L   R   S   L   R   F   L   Q   I   L   R    155

601   GCATGGTGCGCATGGACCGAAGGGGAGGCACTTGGAAATTACTGGGTTCA     650
156      M   V   R   M   D   R   R   G   G   T   W   K   L   L   G   S    171

651   GTGGTTTATGCTCACAGCAAGGAATTAATCACAGCTTGGTACATAGGATT     700
172      V   V   Y   A   H   S   K   E   L   I   T   A   W   Y   I   G   F    188

701   TTTGGTTCTTATTTTTTCGTCTTTCCTTGTCTATCTGGTGGAAAAGGATG     750
189      L   V   L   I   F   S   S   F   L   V   Y   L   V   E   K   D   A    205

751   CCAATAAAGAGTTTTCTACATATGCAGATGCTCTCTGGTGGGGCACAATT     800
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 206    N  K  E  F  S  T  Y  A  D  A  L  W  W  G  T  I      221


 801   ACATTGACAACTATTGGCTATGGAGACAAAACTCCCCTAACTTGGCTGGG     850
 222    T  L  T  T  I  G  Y  G  D  K  T  P  L  T  W  L  G    238


 851   AAGATTGCTTTCTGCAGGCTTTGCACTCCTTGGCATTTCTTTCTTTGCAC     900
 239    R  L  L  S  A  G  F  A  L  L  G  I  S  F  F  A  L    255


 901   TTCCTGCCGGCATTCTTGGCTCAGGTTTTGCATTAAAAGTACAAGAACAA     950
 256    P  A  G  I  L  G  S  G  F  A  L  K  V  Q  E  Q       271


 951   CACCGCCAGAAACACTTTGAGAAAAGAAGGAACCCAGCTGCCAACCTCAT    1000
 272    H  R  Q  K  H  F  E  K  R  R  N  P  A  A  N  L  I    288


1001   TCAGTGTGTTTGGCGTAGTTACGCAGCTGATGAGAAATCTGTTTCCATTG    1050
 289    Q  C  V  W  R  S  Y  A  A  D  E  K  S  V  S  I  A    305


1051   CAACCTGGAAGCCACACTTGAAGGCCTTGCACACCTGCAGCCCTACCAAG    1100
 306    T  W  K  P  H  L  K  A  L  H  T  C  S  P  T  K       321


1101   AAAGAACAAGGGGAAGCATCAAGCAGTCAGAAGCTAAGTTTTAAGGAGCG    1150
 322    K  E  Q  G  E  A  S  S  S  Q  K  L  S  F  K  E  R    338


1151   AGTGCGCATGGCTAGCCCCAGGGGCCAGAGTATTAAGAGCCGACAAGCCT    1200
 339    V  R  M  A  S  P  R  G  Q  S  I  K  S  R  Q  A  S    355


1201   CAGTAGGTGACAGGAGGTCCCCAAGCACCGACATCACAGCCGAGGGCAGT    1250
 356    V  G  D  R  R  S  P  S  T  D  I  T  A  E  G  S       371


1251   CCCACCAAAGTGCAGAAGAGCTGGAGCTTCAACGACCGAACCCGCTTCCG    1300
 372    P  T  K  V  Q  K  S  W  S  F  N  D  R  T  R  F  R    388


1301   GCCCTCGCTGCGCCTCAAAAGTTCTCAGCCAAAACCAGTGATAGATGCTG    1350
 389    P  S  L  R  L  K  S  S  Q  P  K  P  V  I  D  A  D    405


1351   ACACAGCCCTTGGCACTGATGATGTATATGATGAAAAAGGATGCCAGTGT    1400
 406    T  A  L  G  T  D  D  V  Y  D  E  K  G  C  Q  C       421


1401   GATGTATCAGTGGAAGACCTCACCCCACCACTTAAAACTGTCATTCGAGC    1450
 422    D  V  S  V  E  D  L  T  P  P  L  K  T  V  I  R  A    438


1451   TATCAGAATTATGAAATTTCATGTTGCAAAACGGAAGTTTAAGGAAACAT    1500
 439    I  R  I  M  K  F  H  V  A  K  R  K  F  K  E  T  L    455


1501   TACGTCCATATGATGTAAAAGATGTCATTGAACAATATTCTGCTGGTCAT    1550
 456    R  P  Y  D  V  K  D  V  I  E  Q  Y  S  A  G  H      471
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1551  CTGGACATGTTGTGTAGAATTAAAAGCCTTCAAACACGTGTTGATCAAAT  1600
472   L   D   M   L   C   R   I   K   S   L   Q   T   R   V   D   Q   I   488


1601  TCTTGGAAAAGGGCAAATCACATCAGATAAGAAGAGCCGAGAGAAAATAA  1650
489   L   G   K   G   Q   I   T   S   D   K   K   S   R   E   K   I   T   505


1651  CAGCAGAACATGAGACCACAGACGATCTCAGTATGCTCGGTCGGGTGGTC  1700
506   A   E   H   E   T   T   D   D   L   S   M   L   G   R   V   V   521


1701  AAGGTTGAAAAACAGGTACAGTCCATAGAATCCAAGCTGGACTGCCTACT  1750
522   K   V   E   K   Q   V   Q   S   I   E   S   K   L   D   C   L   L   538


1751  AGACATCTATCAACAGGTCCTTCGGAAAGGCTCTGCCTCAGCCCTCGCTT  1800
539   D   I   Y   Q   Q   V   L   R   K   G   S   A   S   A   L   A   L   555


1801  TGGCTTCATTCCAGATCCCACCTTTTGAATGTGAACAGACATCTGACTAT  1850
556   A   S   F   Q   I   P   P   F   E   C   E   Q   T   S   D   Y   571


1851  CAAAGCCCTGTGGATAGCAAAGATCTTTCGGGTTCCGCACAAAACAGTGG  1900
572   Q   S   P   V   D   S   K   D   L   S   G   S   A   Q   N   S   G   588


1901  CTGCTTATCCAGATCAACTAGTGCCAACATCTCGAGAGGCCTGCAGTTCA  1950
589   C   L   S   R   S   T   S   A   N   I   S   R   G   L   Q   F   I   605


1951  TTCTGACGCCAAATGAGTTCAGTGCCCAGACTTTCTACGCGCTTAGCCCT  2000
606   L   T   P   N   E   F   S   A   Q   T   F   Y   A   L   S   P   621


2001  ACTATGCACAGTCAAGCAACACAGGTGCCAATTAGTCAAAGCGATGGCTC  2050
622   T   M   H   S   Q   A   T   Q   V   P   I   S   Q   S   D   G   S   638


2051  AGCAGTGGCAGCCACCAACACCATTGCAAACCAAATAAATACGGCACCCA  2100
639   A   V   A   A   T   N   T   I   A   N   Q   I   N   T   A   P   K   655


2101  AGCCAGCAGCCCCAACAACTTTACAGATCCCACCTCCTCTCCCAGCCATC  2150
656   P   A   A   P   T   T   L   Q   I   P   P   P   L   P   A   I   671


2151  AAGCATCTGCCCAGGCCAGAAACTCTGCACCCTAACCCTGCAGGCTTACA  2200
672   K   H   L   P   R   P   E   T   L   H   P   N   P   A   G   L   Q   688


2201  GGAAAGCATTTCTGACGTCACCACCTGCCTTGTTGCCTCCAAGGAAAATG  2250
689   E   S   I   S   D   V   T   T   C   L   V   A   S   K   E   N   V   705


2251  TTCAGGTTGCACAGTCAAATCTCACCAAGGACCGTTCTATGAGGAAAAGC  2300
706   Q   V   A   Q   S   N   L   T   K   D   R   S   M   R   K   S   721


2301  TTTGACATGGGAGGAGAAACTCTGTTGTCTGTCTGTCCCATGGTGCCGAA  2350
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  722   F   D   M   G   G   E   T   L   L   S   V   C   P   M   V   P   K         738


 2351   GGACTTGGGCAAATCTTTGTCTGTGCAAAACCTGATCAGGTCGACCGAGG           2400
  739    D   L   G   K   S   L   S   V   Q   N   L   I   R   S   T   E   E          755


 2401   AACTGAATATACAACTTTCAGGGAGTGAGTCAAGTGCCTCCAGAGGCAGC           2450
  756     L   N   I   Q   L   S   G   S   E   S   S   A   S   R   G   S            771


 2451   CAAGATTTTTACCCCAAATGGAGGGAATCCAAATTGTTTATAACTGATGA           2500
  772    Q   D   F   Y   P   K   W   R   E   S   K   L   F   I   T   D   E          788


 2501   AGAGGTGGGTCCCGAAGAGACAGAGACAGACACTTTTGATGCCGCACCGC           2550
  789     E   V   G   P   E   E   T   E   T   D   T   F   D   A   A   P   Q        805


 2551   AGCCTGCCAGGGAAGCTGCCTTTGCATCAGACTCTCTAAGGACTGGAAGG           2600
  806     P   A   R   E   A   A   F   A   S   D   S   L   R   T   G   R          821


 2601   TCACGATCATCTCAGAGCATTTGTAAGGCAGGAGAAAGTACAGATGCCCT           2650
  822    S   R   S   S   Q   S   I   C   K   A   G   E   S   T   D   A   L        838


 2651   CAGCTTGCCTCATGTCAAACTGAAATAAGTTCTTCATTTTCTTTCCAGGC           2700
  839    S   L   P   H   V   K   L   K                                           846


 2701   ATAGCAGTTCTTTAGCCATACATATCATTGCATGAACTATTTCGAAAGCC           2750


 2751   CTTCTAAAAAGTTGAAATTGCAAGAATCGGGAAGAACATGAAAGGCAGTT           2800


 2801   TATAAGCCCGTTACCTTTTAATTGCATGAAAATGCATGTTTAGGGATGGC           2850


 2851   TAAAATTCCAAGGTGCATCGACATTAACCCACTCATTTAGTAATGTACCT           2900


 2901   TGAGTTAAAAAGCCTGAGAAACCAAACACAGCTAATGCTATGGGGTGTAT           2950


 2951   GAATATGTCAAGTTTAGGTCATTTAGAAGATTTGACACTGTATTTTGAAA           3000


 3001   TTATGGGAGTAAACACCTTCAAATTTCAGGCATTCTGCTTTGTGACTAA           3050


 3051   ATACAAACTACATTTTCAAGATTAGGCCATAATGTATATTTAAACACAAT           3100


 3101   GGCTATCAACAGCTGCTAATAAGGTATCAACTAAAGCAGAATTGGGGAAT           3150


 3151   AATAGAAATGGCTGCTTATTTCAAGATATATTTGCCAACCCATTCCTATT           3200


 3201   CAGTCATTTTATTATTAATGTAATTTGAATGTCAATTTGTGTGCTTTTGG           3250
```

```
3251  TGATTTAGCGCTGTGGCAAGCAATTTTGCACATCATTTTCATGTTGTTCT  3300

3301  TTATGACAAGAATGTTCTTCAATTAGAAAATGTGCAAATAATGAAATTCA  3350

3351  GGGCCAGTGAGGCAAATAGACTATCTGACATATTTGACTTTATGAAAACA  3400

3401  TATTGCCTGATGGCAGAATCAACTTTATAAGTGGTCAACTTCTACACAAG  3450

3451  CGTATGAAATACTGGTCAGTAGAACAGCCATTGTGATTGGACTGGTTTCT  3500

3501  CTGCAATGGCGCCAACCCCAGGCTTGCCAATACTGCCTATGTAAAGGGCA  3550

3551  AGTGTGAGAAGCTATTCTCATTTCGCTGACATACAGGTAGGACTATGGGG  3600

3601  GATGGGACATTTGAGTGGGACTGAGATAGGAAAGGCTTGAAAAGAACCCA  3650

3651  GAAACACCACCAGGAAGTTGGCAAAGTAAAAGAAAATGACTTCCCCCTCA  3700

3701  AAGGGCAATGAGAGGGAG
```

FIGURE 3A
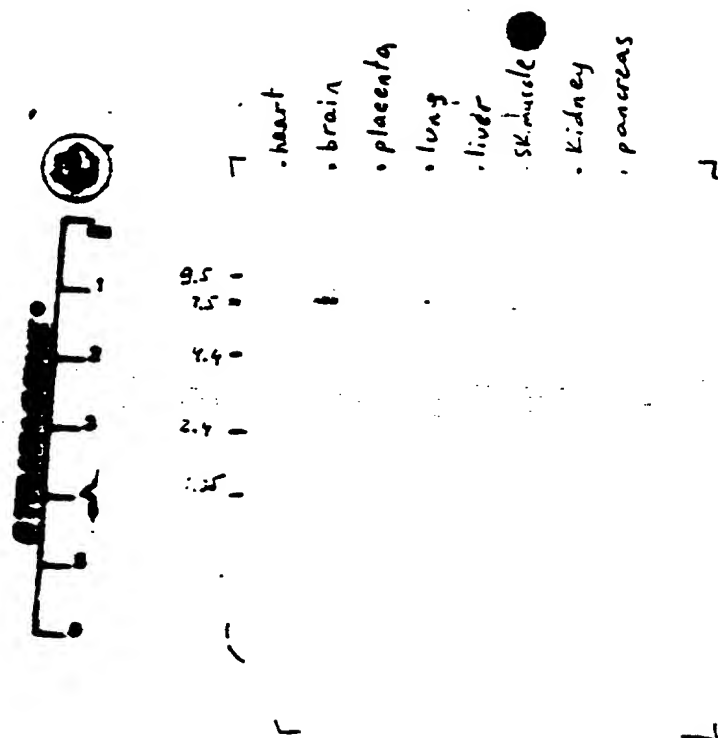
probe: DL/ER PCR fragment.

FIGURE 3B

RT-PCR analysis of the KCN6q gene expression in human tissues

KCN6q cDNA
22 cycles
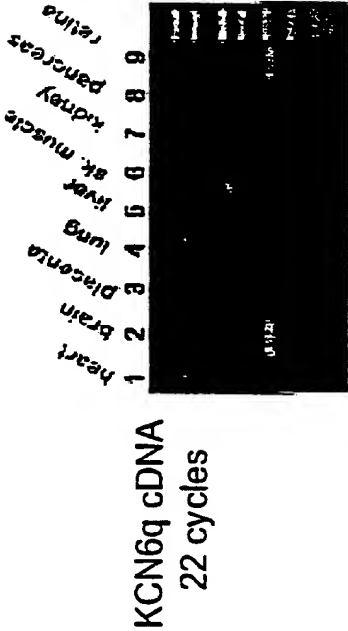
FIGURE 4A

```
KCN6q_      ..................................................................MS.....LLGKPLS.......
KCNQ4_      MAEAPPRRLGLGPPPGDAPRAELVALTAVQSEQGEAGGGGSPRRLGLLGSPLPPGAPLPG
consensus   maeapprrlgigpppgdapraelvaltavqseqgeaggg SprrlgLLG PL pgaplpg

KCN6q_      YTS.SQS.CR.RN...VK.YRRVQNIIYNVLERPRGWAFIYHAFVFLLVFGCLILSVFST
KCNQ4_      PGSGSGSACGQRSSAAEKRYRRVQNLIYNVLERPRGWAFVYHVFIFLLVFSCLILSVLST
consensus    SgS SaC qR saa KrYRRvQNylYNVLERPRGWAPiYH PvFLLVF CLiLSV ST

KCN6q_      IPEHTKLASSCLLILEFVMIVVFGLEIIIRIWSAGCCCRYRGWQGRLRFARKPFCVIDTI
KCNQ4_      IQEHQELANECLLILEFVMIVVFGLEYIIRIWSAGCCCRYRGWQGRFRFARKPFCVIDFI
consensus   I EH  LA  CLLILEFVMIVVFGLEfIIRiWSAGCCCRYRGWQGR RFARKPFCVID I

KCN6q_      VLTASIAVYSAKTQGNIFATSALRSIRFLQILRMVRMDRRGGTWKLLGSVVYAHSKELIT
KCNQ4_      VFTASIAVLAAGTQGNIFATSALRSIRFLQILRMVRMDRRGGTWKLLGSVVYAHSKELIT
consensus   V iASiAVv A TQGNIFATSALRSiRFLQILRMVRMDRRGGTWKLLGSVVYAHSKELIT

KCN6q_      AWYIGFLVLIFSSFLVYLVEKDANKEFSTYADALWWGTITLTTIGYGDKTPLTWLGRLLS
KCNQ4_      AWYIGFLVLIFASFLVYLAEKDANSDFSSYADSLWWGTITLTTIGYGDKTPHTWLGRLLA
consensus   AWYIGFLVLIF SFLVYL EKDAN eFStYAD LWWGTITLTTIGYGDKTP TWLGRiL

KCN6q_      AGFALLGISFFALPAGILGSGFALKVQEQHRQKHFEKRRNPAANLIQCVWRSYAADEKS.
KCNQ4_      AGFALLGISFFALPAGILGSGFALKVQEQHRQKHFEKRRNPAANLIQAAWRLYSTD.MSR
consensus   AGFALLGISFFALPAGILGSGFALKVQEQHRQKHFEKRR PAANLIQ  WR Y  De Sr

KCN6q_      .VSIATWKP...HLK.....ALH.............................................
KCNQ4_      AYLTATWYYDSILPSFRELALLFEHVQRARNGGLRPLEVRRAPVPDGAPSRYPPVATCHTCS
consensus   a    ATW  yds L sfrelAL fehvqrarngglrplevrrapvpdgapsryppvaTC

KCN6q_      .P...TKKEQGEASSSQKLSPKERVRMASP.R...GQSIKSRQASVGDRRSPSTHITKEG.S
KCNQ4_      RPGSTSPCPGE...SSRMG.IKDRIRMGSSQRRTGPS.KQQLAPPTMPTSPSSEQVGERTS
consensus   rPgsT   GEasSS   s KeRvRMaS qRrtG SiK   A   SPStd  aEgts

KCN6q_      PTKVQKSWSFNDRTRFRPSLRLKSSQPKPVIDADTALGTDDVYDEKGCQCDVSVVDITPP
KCNQ4_      PTKVQKSWSFNDRTRFRASLRLK...PK...TSAEDAP.SEEVAEEKSYQCELEVQDIMPA
consensus   PTKVQKSWSFNDRTRFR SLRLKssqPkpv  Ad A gtddV dEK  QCdvsVeDi P

KCN6q_      LKTVIRAIRINKFHVAKRKFKETLRPYDVKDVIEQYSAGHLDMLCRIKSLQTRVDQIIGK
KCNQ4_      LKTVIRSIRIRKFLVAKRKFKETLRPYDVKDVIEQYSAGHLDMLGRIKSLQTRVDQIIGR
consensus   lKTVIR IRImKF VAKRKFKETLRPYDVKDVIEQYSAGHLDML RIKSLQTRVDQIIGk

KCN6q_      GQITSDKKSREK...ITAEHETTDDSMGRVVKVEKQVQSIESKLDCLLDIYQQVLRKG
KCNQ4_      G..PGDRKAREKGDKGPSDAEVVDEISMGRVVKVEKQVQSIEHKLDLLLGPYSRCLRSG
consensus   Gqi  DkK REKgdk   e E  DdlSMlGRVVKVEKQVQSIE KLD LL  Y   LR G

KCN6q_      .SASALALSPQIPPECEQTSDYQSPVDSKDESGSAQ.NSGCISRSTSANLSRGLQFIL
KCNQ4_      TSAS...LGAVQVPLEDPDITSDYHSPVDHEDLSVSAQTLS..ISRSVSTNMD.
consensus   tSASalaLa  QiP Pe e TSDY SPVD  DlS SAQt Sgclsrs S Ni rglqfil

KCN6q_      TPNEFSAQTFYALSPTMHSQATQVPISQSDGSAVAATNTIANQINTAPKPAAPTTLQIPP
KCNQ4_      ...........................................................
consensus   tpnefsaqtfyalsptmhsqatqvpisqsdgsavaatntianqintapkpaapttlqipp

KCN6q_      PLPAIKHLPRPETLHPNPAGLQESISDVTTCLVASKENVQVAQSNLTKDRSMRKSFDMGG
KCNQ4_      ...........................................................
consensus   plpaikhlprpetlhpnpaglqesisdvttclvaskenvqvaqsnltkdrsmrksfdmgg

KCN6q_      ETLLSVCPMVPKDLGKSLSVQNLIRSTEELNIQLSGSESSASRGSQDFYPKWRESKLFIT
KCNQ4_      ...........................................................
consensus   etllsvcpmvpkdlgkslsvqnlirsteelniqlsgsessasrgsqdfypkwresklfit

KCN6q_      DEEVGPEETETDTFDAAPQPAREAAFASDSLRTGRSRSSQSICKAGESTDALSLPHVKLK
KCNQ4_      ...........................................................
consensus   deevgpeetetdtfdaapqpareaafasdslrtgrsrssqsickagestdalslphvklk
```

FIGURE 4B

```
KCN6q_    ..............................................................
KCNQ4_    MXEAPPRRLG....LGPPPGD....APRAELVALTAVQSE................QGEAGG
KCNQ2_    MVQKSR....NGGVYPG......PSGEKKLKVG....FVGLDPGAPDSTRDGALLI
KCNQ3_    MGLKARRAAGAAGGGDGGGGGGGAANPAGGDAAAAGDEERKVGLAPG..DVEQVTLALG
KCNQ1_    ..............................................................
consensus ma  k  rr   gaag  gg   pg  gggaa  pag    al  ag    er  vgl pgapd       g alg

KCN6q_    .MS....LLGKPLS...............YTS......SQS.CR.RN...VK.YRRXQNX
KCNQ4_    GGSPRRLGLLGSPLPPGX.PLPG......PGSG....SGSACGQRSSAAHKRYRRLQNX
KCNQ2_    AGS..EAPKRGSILSKP.RAGG....AGAG...R......PPKRN...AF.YRXLQNX
KCNQ3_    AG...ADKDGXLLLEGCGRDEGQRRTPQGIGLLAKTPLSRPVKRNN...AK.YRRXQTLX
KCNQ1_    .................................METRGS.....RLTGGQGRX
consensus agspr  a  lgspls gagr  gqrrtp gsgllakts  s      kRnsaaakryrrlQnyl

KCN6q_    YNVLERPRGWA.FXYHAFVFLLVFGCLILSVFSTIPEHTKLAXSCLLILEFVMIVVFGLE
KCNQ4_    YNVLERPRGWA.FXYHVFXFLLVFSCLVLSVLSTIQEHQELANECLLILEFVMIVVFGLE
KCNQ2_    YNVLERPRGWA.FXYHAXVFLLVFSCLVLSVFSTIKEYEKSSEGALYILEIVTIVVFGVE
KCNQ3_    YDALERPRGWA.LXYHALVFLXVLGCLILAVLXTFKEYETXSGDWLLLETFAIFXFGAE
KCNQ1_    YNFLERPTGWKCFXYHPAVFLXVLCLIFSVLSTIEQYAALAXGTLFWMEIVXXVFGTE
consensus YnvLERPrGWacfiYHafvFLlVf CLilsVlsTikeyeklasgcLlilE vmivvPGlE

KCN6q_    XIXRIWSAGCCCRYRGWXGRLRFARKPFCVIDTIVLIASXAVXSAKXQGNXFATSALRSL
KCNQ4_    YIVRXWSAGCCCRYRGWQGRXRFARKPFCVIDFIVPXASXAVXAAGXQGNVFATSALRSX
KCNQ2_    YFVRIWAAGCCCRYRGWRGRLXFARKPFCVIDIXVLIASXAVXAAGXQGNVFATSALRSX
KCNQ3_    XAXRIWAAGCCCRYXGWRGRLXFARKPLCXXDIFVLIASXPVXAVGNQGNVLATS.LRSL
KCNQ1_    YXVRXWSAGCRSXYVGLWGRLRFARKPISXIDXIVYXASXVVXCVGXKGXVFATSAXRGX
consensus yivRiWsAGCccrYrGw GRlrFARKPfcviDiivliASiaVvaagtqGnvfATSalRsl

KCN6q_    RFLQILRMXRMDRRGGTWKLLGSVVYAHSKELITAWYIGFLVLIFSSFLVYLXVEKD....
KCNQ4_    RFLQILRMXRMDRRGGTWKLLGSVVYAHSKELITAWYIGFLVLIFAXSFLVYLAEKD....
KCNQ2_    RFLQILRMXRMDRRGGTWKLLGSVVYAHSKELXTAWYIGFLXCLILAXSFLVYLAEK.....
KCNQ3_    RFLQILRMXRMDRRGGTWKLLGSAXCAHSKELITAWYIGFLXTLILSSFLVYLXVEKDVPEX
KCNQ1_    RFLQILRMXHVDRQGGTWKLLGSVVXIHRQELITTLYIGFLGXLIFSSXFVYLAEKDAVN.
consensus RFLQILRMvrmDRrGGTWkLLGSvvyaHskELiTawYIGFLvLIfssflVYLaEKd       v

KCN6q_    .......ANKEFSTYADALWWGXITLTTIGYGDKTPLTWLGRLLXSAXGFALXKGISFFALPAG
KCNQ4_    .......ANSDFSXYADSLWWGXITLTTIGYGDKTPHTWLGRXLAAGFALXGISFFALPAG
KCNQ2_    ...GE..NDXFDTYADALWWGXITLTTIGYGDKTPHTWLGRXLAAGFALXGISFFALPAG
KCNQ3_    DAQGEXMKXEFXTYADALWWGXITLAXTIGYGDKYPQTWXGRLLAATFXLXGXSFFALPAG
KCNQ1_    ....ESGRVEFGXYADALWWGXXTVTTIGYGDKVPQTWXGRLXAATFXXASCFXVFAXSFFALPAG
consensus daqge  andeFstYADaLWWGliTlTtTIGYGDKtPqTWlGrllaa  Ftllgisffalpag

KCN6q_    ILGSGFALKVQEQHRQKHFEKRRNPAANLIQCVWRXSYAADEKS..VSIATWKP.....HL
KCNQ4_    ILGSGFALKVQEQHRQKHFEKRRMPAANLIQAAWRXLYSTD.MSRAYLTATWYYX..SIL
KCNQ2_    ILGSGFALKVQEQHRQKHFEKRRNPAAGLIQSAWRXYATN.LSRTDLHSTWQYYERTVXX
KCNQ3_    ILGSGXALKVQEQHRQKHFEKRRXPAAELIQAAWRXYATN.PNRIDLVATWRXYESVVXP
KCNQ1_    ILGSGFALKVQXQKQRQKHFNXQIPAAASLIQTAWRCYAAXNPD....SSTWKIX
consensus ILGSGfALKVQeqhRQKHFekrrnpAAnLIQaawRfYatd  psr  dl  aTWkyye   vtl

KCN6q_    K.........ALH...............................................
KCNQ4_    PSFREX....ALLFEHVQRARNGGLRPLEVRRAPVPDGAPSRYPPVATCHXPGSTCS.P....TKKE
KCNQ2_    PMXRLIXPLNQLELLRN...........................................TSPC
KCNQ3_    PPFRKE....QLEAA............................................LKSXSGLAFRKDP
KCNQ1_    ..IRKAPRSHTLLSP.............................................S..........
consensus p  frklp       L      grarngglrplevrrapvpdgapsryppvatcsrpg  aftk

KCN6q_    QGEASSSQKXSFKSRVRMASP.R..GXSIKSRQAXSVGDRRSPSTDIXAXG.SPXKVQKSW
KCNQ4_    PGX..SSRMG.XKDRXRMGSSQRRTGPS.KQQLAXPTXPTSPSSEQVGEATSPXKVQKSW
KCNQ2_    PPEPSPSQKVSLKDRVPSS.P.RGVXAKGKGSPQAQTVRRSPSADQXLED.SPXKVPKSW
KCNQ3_    ......SOKXGLLDRVRXSNP.RGSNTKGKXPT........PLNVDAIEE.SPXKEPKPV
KCNQ1_    .PKPKKSVVXKKKKFKLDKDN..GVTPGEKMLTVX......HIXCDPPEE..RRLDHFSV
consensus p  epsssqklslkdrvrmsspqrgvgp  gKl  tap  tmrrspstd  t  Eetsptkv  ksw

KCN6q_    SFNDRXRFRPSLRLKXSSQPKPXIDAXTALG.TDDVXDEKGCQCDVXVEDLTPPLKTVIRA
KCNQ4_    SFNDRXRFRASLRLK...PR..TSXEDAP..SXKVAXEKSYQCXLXVXDXMPXXKTVIRS
KCNQ2_    SFCDRXRARQAFRIKXAASR..QNSEXASLPGXDXVDDKSCPCXFVTEDLTPXLKVSIRA
KCNQ3_    GLNNKXRFRXAFRMKXAYAFW..QSSEDAGT.GXPMAXDRGYGNDXPXEDMIPTXKAAIRA
KCNQ1_    DGYDXSXVRKXPTLLEVSMXHFMRTNSFAED..LDXEGXTLLTPITHISQLREHHRATIXV
consensus sfndrtrfrt   rlkgsapr  vqs  edA  pgddvadek  qcdfsvedltpalk  vIra
```

FIGURE 4C

```
KCN6q_     IRIM FEVAKRKFKETLRPYDVKDVIEQYSAGHLDMLCRIKSLQTRVDQI G GQ.ITSD
KCNQ4_     IRIM FLVAKRKFKE LRPYDVKDVIEQYSAGHLDMLGRIKSLQTRVDQIVG G...PGD
KCNQ2_     VC M FLVSKRKFKE LRPYDVMDVIEQYSAGHLDMLSRIKSLQ RVDQIVG GPA TDK
KCNQ3_     VRI  FR Y K KFKETLRPYDVKDVIEQYSAGHLDMLSRIKSLQ RVDQIVG GPA TDK
KCNQ1_     IRRMQ FVAK KFQQAR PYDV DVIEQYSQGHLN  VRIKE QRR DMIFTPGPPS PK
consensus  irimkflvaKrKFketlrPYDVkDVIEQYSaGHLdmlsRIKsLQtRvDqivgkgp it

KCN6q_     KKSREK.............ITAEHETTD.....D SM GR VKVEKQVQS ESKLD L
KCNQ4_     RKAREKGDK...........GP SDAE VD.....   SMMGR VKVEKQVQS EHKLD L
KCNQ2_     D..RTKG.............PAEAE P.....EDP SMMGR CKVEKQVLSMEKKLD L
KCNQ3_     HKKSQKGSAFTFPSQQSPRNE PYVAR.PST SEIEDQ SMHGK FVKVE QOVQDM GKKLD L
KCNQ1_     ISVSEK.............SKDR.GSN.... EGAR NRVEDKVTQ QR ALIT
consensus  kk reKg ftfpsqqsprn p eaevp seiedlsmmgrvvkVEkqVqsiekkLd ll

KCN6q_     D YQQ LRKG.SASA ALA SFQ PPFECEQTSDYQSPVDSK...DLSGSAQ.N GC SRS
KCNQ4_     GFYSRCLRSGTSAS...LGAVQVPLPDP ITSDYHSPVDHE...D SVSAQTLS..ISRS
KCNQ2_     N YMQRMG...IPPTETE Y..FG KEPE PAPPYHSPEDSREHMDRHGCIV....KIVRS
KCNQ3_     D HMQHMER.LQVQVTEYVPTKGTSSPAEAE...KKEDNE YSDLK......TIICN
KCNQ1_     D LHQ L SLHGGS PGS GPPREG AHITQPCGSGGS VDPELE PSNTLPTYEQLT PRR
consensus  diymqvlrkg sas lt aypqigafepeq sdyhspvDsk yvdlsgsaq s tisrs

KCN6q_     TSANI GLQ ILTPNEFSAQTFYALSPTMHSQATQVPI SQSDGS AVAAT TIA QIN A
KCNQ4_     VSTNMD...................................
KCNQ2_     SSSTGQK...NFSAPPAA........PPVQCPPST....SWQ.....PQSHPRQGHGTS
KCNQ3_     YSETG.........PPE........PPYSFHQVTIDKVSPYGFPAHD VNLPR.G.GPS
KCNQ1_     GPDEGS...................................
consensus  ts gsrglq ppe saqtfyalpp q t is a p n prng gts

KCN6q_     PKP APT LQIPPPLPAIKH PRPE LHPNPA LQESISDVTTCLVASKEN QVAQSNLT
KCNQ4_     ......................................
KCNQ2_     PV GDHG LVRIPPPPAH...ER..SLSAYG GN.........RASMEF .RQEDTP
KCNQ3_     .....SGKVQATPPSSATTY ERETVLPILTLLDS.........RVSCHS....QADLQ
KCNQ1_     ......................................
c nsensus  p pa gtlq pp pa lerp tl ag esisdvttclras e vqv q dl

KCN6q_     KDRSMRKSFDMGGETLLSVCPMVPKDLGKSL.SV NLIRST EELNIQLSG SESS ASRGSQ
KCNQ4_     ......................................
KCNQ2_     G......CRPPEGTLR....D..SDTSISSPSVD.....HEELERSPSGFSISQS NL
KCNQ3_     GPYSDRISPRQRRSITR....D..SDTPLSLMSVN.....HEELERSPSGFSISQDRH..
KCNQ1_     ......................................
consensus  g s r s r tlrsvcpdvpsdt isl svqnlirsheelers sgfsisqsre

KCN6q_     D YPKWRESKLE TDEEVGPE TETDT PDAAPQ P.......AREA PA SDS RTGRS SS
KCNQ4_     ......................................
KCNQ2_     DA NSCY A VAPCAKV RPY AEGE SDTDSDLCTPCGP PRSATGE GPPFGDVGWAGPRK..
KCNQ3_     D YFGPNQGSSN REKR.Y AEGETDTD DPPTPSGSMPLSSTGDG.ISDS WTPSNKPI
KCNQ1_     ......................................
consensus  dfl aa fi d r yiaegetdtdsd tp g p satgeg sdslwtg k

KCN6q_     QSICKAGESTDALSLPHVKLK
KCNQ4_     .....................
KCNQ2_     .....................
KCNQ3_     .....................
KCNQ1_     .....................
consensus  qsickagestdalslphvklk
```